GARMIN

G1000®

Integrated Flight Deck

Cockpit Reference Guide

Socata
TBM 850

SYSTEM OVERVIEW
FLIGHT INSTRUMENTS
ENGINE & AIRFRAME SYSTEMS
NAV/COM/TRANSPONDER
AUDIO PANEL
AUTOMATIC FLIGHT CONTROL
NAVIGATION
FLIGHT PLANNING
PROCEDURES
HAZARD AVOIDANCE
ADDITIONAL FEATURES
ABNORMAL OPERATIONS
ANNUNCIATIONS & ALERTS
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This manual reflects the operation of System Software version 0719.00 or later for the Socata TBM 850. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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WARNING: *Navigation and terrain separation must NOT be predicated upon the use of the terrain function. The G1000 Terrain Proximity feature is NOT intended to be used as a primary reference for terrain avoidance and does not relieve the pilot from the responsibility of being aware of surroundings during flight. The Terrain Proximity feature is only to be used as an aid for terrain avoidance and is not certified for use in applications requiring a certified terrain awareness system. Terrain data is obtained from third party sources. Garmin is not able to independently verify the accuracy of the terrain data.*

WARNING: *The displayed minimum safe altitudes (MSAs) are only advisory in nature and should not be relied upon as the sole source of obstacle and terrain avoidance information. Always refer to current aeronautical charts for appropriate minimum clearance altitudes.*

WARNING: *The altitude calculated by G1000 GPS receivers is geometric height above Mean Sea Level and could vary significantly from the altitude displayed by pressure altimeters, such as the GDC 74A Air Data Computer, or other altimeters in aircraft. GPS altitude should never be used for vertical navigation. Always use pressure altitude displayed by the G1000 PFD or other pressure altimeters in aircraft.*

WARNING: *Do not use outdated database information. Databases used in the G1000 system must be updated regularly in order to ensure that the information remains current. Pilots using any outdated database do so entirely at their own risk.*

WARNING: *Do not use basemap (land and water data) information for primary navigation. Basemap data is intended only to supplement other approved navigation data sources and should be considered as an aid to enhance situational awareness.*

WARNING: *Traffic information shown on the G1000 Multi Function Display is provided as an aid in visually acquiring traffic. Pilots must maneuver the aircraft based only upon ATC guidance or positive visual acquisition of conflicting traffic.*

WARNING: *Use of the Stormscope is not intended for hazardous weather penetration (thunderstorm penetration). Stormscope information, as displayed on the G1000 MFD, is to be used only for weather avoidance, not penetration.*

WARNING: *GDL 69 Weather should not be used for hazardous weather penetration. Weather information provided by the GDL 69 is approved only for weather avoidance, not penetration.*

WARNING: *NEXRAD weather data is to be used for long-range planning purposes only. Due to inherent delays in data transmission and the relative age of the data, NEXRAD weather data should not be used for short-range weather avoidance.*

WARNING: *The Garmin G1000, as installed in the Socata TBM 850 aircraft, has a very high degree of functional integrity. However, the pilot must recognize that providing monitoring and/or self-test capability for all conceivable system failures is not practical. Although unlikely, it may be possible for erroneous operation to occur without a fault indication shown by the G1000. It is thus the responsibility of the pilot to detect such an occurrence by means of cross-checking with all redundant or correlated information available in the cockpit.*

WARNING: *For safety reasons, G1000 operational procedures must be learned on the ground.*

WARNING: *The United States government operates the Global Positioning System and is solely responsible for its accuracy and maintenance. The GPS system is subject to changes which could affect the accuracy and performance of all GPS equipment. Portions of the Garmin G1000 utilize GPS as a precision electronic NAVigation AID (NAVAID). Therefore, as with all NAVAIDs, information presented by the G1000 can be misused or misinterpreted and, therefore, become unsafe.*

WARNING: *To reduce the risk of unsafe operation, carefully review and understand all aspects of the G1000 Pilot's Guide documentation and the Socata TBM 850 Pilot's Operating Handbook (POH). Thoroughly practice basic operation prior to actual use. During flight operations, carefully compare indications from the G1000 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety purposes, always resolve any discrepancies before continuing navigation.*

WARNING: *The illustrations in this guide are only examples. Never use the G1000 to attempt to penetrate a thunderstorm. Both the FAA Advisory Circular, Subject: Thunderstorms, and the Aeronautical Information Manual (AIM) recommend avoiding "by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."*

WARNING: *Lamp(s) inside this product may contain mercury (HG) and must be recycled or disposed of according to local, state, or federal laws. For more information, refer to our website at www.garmin.com/aboutGarmin/environment/disposal.jsp.*

WARNING: *Because of anomalies in the earth's magnetic field, operating the G1000 within the following areas could result in loss of reliable attitude and heading indications. North of 70° North latitude and south of 70° South latitude. An area north of 65° North latitude between longitude 75° West and 120° West. An area south of 55° South latitude between longitude 120° East and 165° East.*

CAUTION: *The PFD and MFD displays use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.*

CAUTION: *The Garmin G1000 does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and the pilot's authority to operate this device under FAA/FCC regulations.*

NOTE: *When using Stormscope, there are several atmospheric phenomena in addition to nearby thunderstorms that can cause isolated discharge points in the strike display mode. However, clusters of two or more discharge points in the strike display mode do indicate thunderstorm activity if these points reappear after the screen has been cleared.*

NOTE: *All visual depictions contained within this document, including screen images of the G1000 panel and displays, are subject to change and may not reflect the most current G1000 system and aviation databases. Depictions of equipment may differ slightly from the actual equipment.*

NOTE: *This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

NOTE: *Interference from GPS repeaters operating inside nearby hangars can cause an intermittent loss of attitude and heading displays while the aircraft is on the ground. Moving the aircraft more than 100 yards away from the source of the interference should alleviate the condition.*

NOTE: *Use of polarized eyewear may cause the flight displays to appear dim or blank.*

NOTE: *This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at www.garmin.com/prop65.*

Part Number	Change Summary
190-00708-00	Initial Release

Revision	Date of Revision	Affected Pages	Description
A	November, 2007	i through Index-4	Production Release

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SECTION 1: SYSTEM OVERVIEW

The purpose of this Cockpit Reference Guide is to provide the pilot a resource with which to find operating instructions on the major features of the G1000 system more easily. **It is not intended to be a comprehensive operating guide.** Complete operating procedures for the complete system are found in the G1000 Pilot's Guide for the Socata TBM 850 (190-00709-00):

This guide gives the pilot abbreviated operating instructions for the Primary Flight Displays (PFDs), Multi Function Display (MFD), GMA 1347D Cabin Audio Panel System, GCU 475 MFD Control Unit, and GMC 710 AFCS Control Unit.

NOTE: *The pilot should read and thoroughly understand the Socata TBM 850 Pilot's Operating Handbook (POH) for limitations, procedures and operational information not contained in this Cockpit Reference Guide. The POH always takes precedence over the information found in this guide.*

1.1 PFD CONTROLS

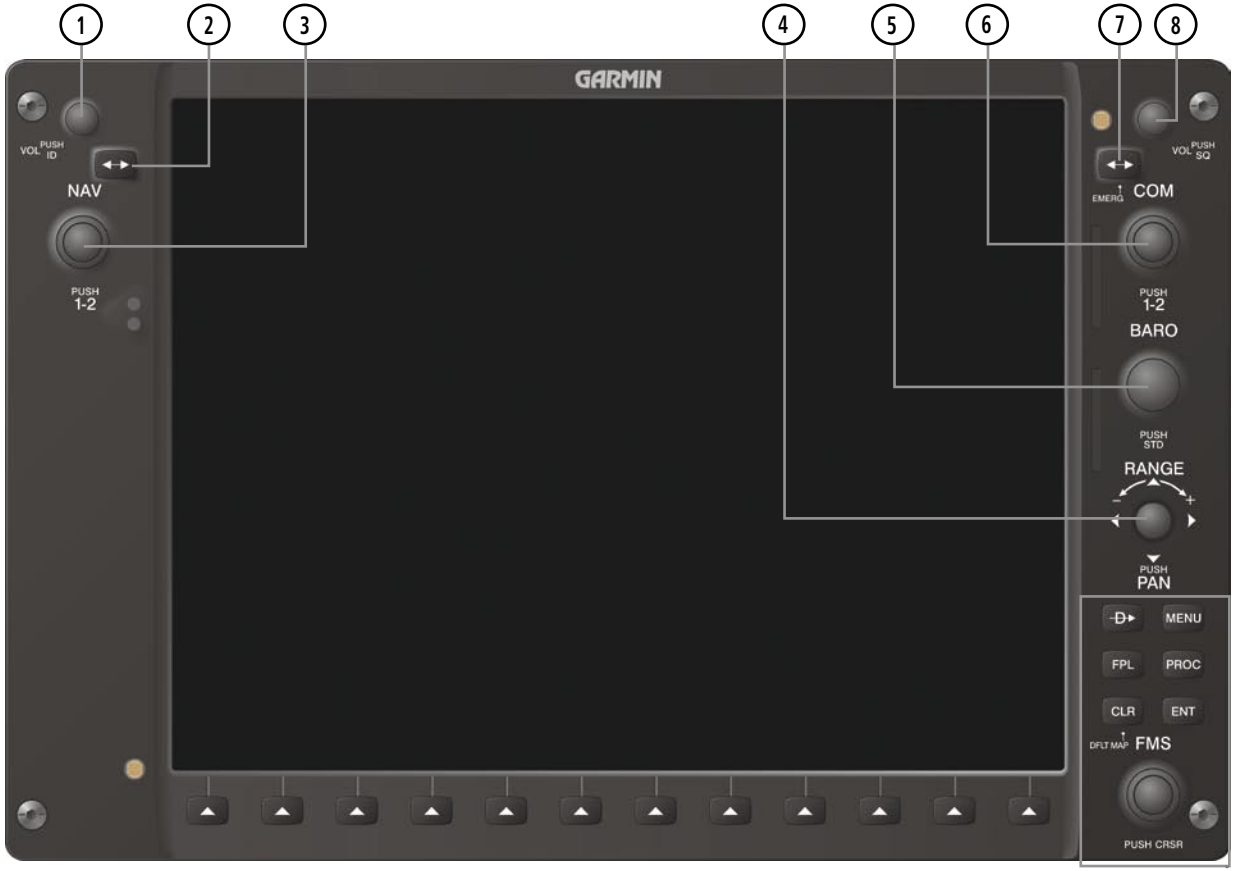
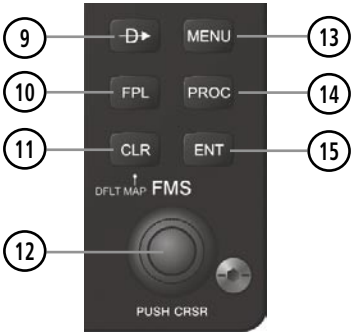


Figure 1-1 PFD Controls



The following list provides an overview of the controls located on the PFD bezel (see Figure 1-1).

(1) **NAV VOL/ID Knob** – Controls NAV audio volume level. Press to switch the Morse code identifier audio ON and OFF. Volume level is shown in the NAV frequency field as a percentage.

(2) **NAV Frequency Transfer Key** – Switches the standby and active NAV frequencies.

(3) **Dual NAV Knob** – Tunes the standby frequencies for the NAV receiver (large knob for MHz; small knob for kHz). Press to switch the tuning box (light blue box) between NAV1 and NAV2.

(4) **Joystick** – Changes the map range when rotated. Activates the map pointer when pressed.

(5) **BARO Knob** – Sets the altimeter barometric pressure. Press to enter standard pressure (29.92).

(6) **Dual COM Knob** – Tunes the standby frequencies for the COM transceiver (large knob for MHz; small knob for kHz). Press to switch the tuning box (light blue box) between COM1 and COM2.

(7) **COM Frequency Transfer Key** – Switches the standby and active COM frequencies. Press and hold this key for two seconds to tune the emergency frequency (121.5 MHz) automatically into the active frequency field.

(8) **COM VOL/SQ Knob** – Controls COM audio volume level. Volume level is shown in the COM frequency field as a percentage. Press to turn the COM automatic squelch ON and OFF.

(9) **Direct-to Key** (D▸) – Allows the user to enter a destination waypoint and establish a direct course to the selected destination (the destination is either specified by the identifier, chosen from the active route, or taken from the map pointer position).

(10) **FPL Key** – Displays the active Flight Plan Page for creating and editing the active flight plan.

(11) **CLR Key** – Erases information, cancels entries, or removes page menus.

(12) **Dual FMS Knob** – Flight Management System Knob. Press the **FMS** Knob to turn the selection cursor ON and OFF. When the cursor is ON, data may be entered in the applicable window by turning the small and large knobs. The large knob moves the cursor on the page, while the small knob selects individual characters for the highlighted cursor location.

(13) **MENU Key** – Displays a context-sensitive list of options. This list allows the user to access additional features or make setting changes that relate to particular pages.

(14) **PROC Key** – Gives access to IFR departure procedures (DPs), arrival procedures (STARs) and approach procedures (IAPs) for a flight plan. If a flight plan is used, available procedures for the departure and/or arrival airport are automatically suggested. These procedures can then be loaded into the active flight plan. If a flight plan is not used, both the desired airport and the desired procedure may be selected.

(15) **ENT Key** – Validates or confirms a menu selection or data entry.

1.2 CONTROLS ASSOCIATED WITH THE MFD

The controls for the MFD (GDU 1500) are located on both the MFD bezel and the MFD Control Unit (GCU 475). The bottom portion of the MFD bezel features 12 softkeys that are designed to perform various functions depending upon the specific page being displayed. These softkeys are discussed throughout the Pilot's Guide documentation.

The following list provides an overview of the controls located on the MFD Control Unit (see Figure 1-2):

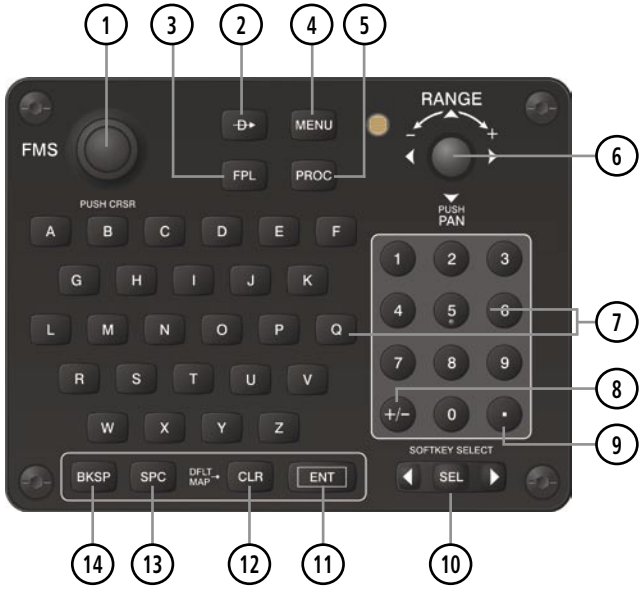


Figure 1-2 MFD Control Unit (GCU 475)

1. **Dual FMS Knob** – Flight Management System Knob. This knob selects the MFD page to be viewed; the large knob selects a page group (MAP, WPT, AUX, NRST), while the small knob selects a specific page within the page group. Pressing the **FMS** Knob turns the selection cursor ON and OFF. When the cursor is ON, data may be entered in the applicable window by turning the small and large knobs. In this case, the large knob moves the cursor on the page, while the small knob selects individual characters for the highlighted cursor location.

2. **Direct-to Key (D▸)** – Allows the user to enter a destination waypoint and establish a direct course to the selected destination (the destination is either specified by the identifier, chosen from the active route, or taken from the map pointer position).

3. **FPL Key** – Displays the active Flight Plan Page for creating and editing the active flight plan, or for accessing stored flight plans.

4. **MENU Key** – Displays a context-sensitive list of options. This list allows the user to access additional features or make setting changes that relate to particular pages.

5. **PROC Key** – Gives access to IFR departure procedures (DPs), arrival procedures (STARs) and approach procedures (IAPs) for a flight plan. If a flight plan is used, available procedures for the departure and/or arrival airport are automatically suggested. Theses procedures can then be loaded into the active flight plan. If a flight plan is not used, both the desired airport and the desired procedure may be selected.

6. **Joystick** – Changes the map range when rotated. Activates the map pointer when pressed.

7. **Alphanumeric Keys** – Allow the user to enter data quickly, without having to select individual characters with the **FMS** Knob.

(8) **Plus (+) Minus (-) Key** – Switches between a (+) or (-) character.

(9) **Decimal Key** – Enters a decimal point.

(10) **SEL Key** – The center of this key activates the selected softkey, while the right and left arrows move the softkey selection box to the right and left, respectively.

(11) **ENT Key** – Validates or confirms a menu selection or data entry.

(12) **CLR Key** – Erases information, cancels entries, or removes page menus. Pressing and holding this key displays the Navigation Map Page automatically.

(13) **SPC Key** – Adds a space character.

(14) **BKSP Key** – Moves the cursor back one character space.

1.3 AFCS CONTROLS

*NOTE: With the exception of the **FD** and **SPD** Keys, if a key is selected, its respective annunciator is illuminated.*

The GFC 700 AFCS is mainly controlled through the GMC 710 AFCS Control Unit. The AFCS Control Unit consists of the following controls:

(1) **HDG Key** – Selects/deselects Heading Select Mode.

(2) **APR Key** – Selects/deselects Approach Mode.

(3) **NAV Key** – Selects/deselects Navigation Mode.

(4) **FD Key** – Activates/deactivates the flight director in the default pitch and roll modes. If the autopilot is engaged, the **FD** Key is disabled.

(5) **XFR Key** – Switches the autopilot between the pilot-side and the copilot-side flight directors. This selection also selects which air data computer is communicating with the active transponder and which PFD triggers the altitude alert. Upon power-up, the pilot-side FD is selected.

(6) **ALT Key** – Selects/deselects Altitude Hold Mode.

(7) **VS Key** – Selects/deselects Vertical Speed Mode.

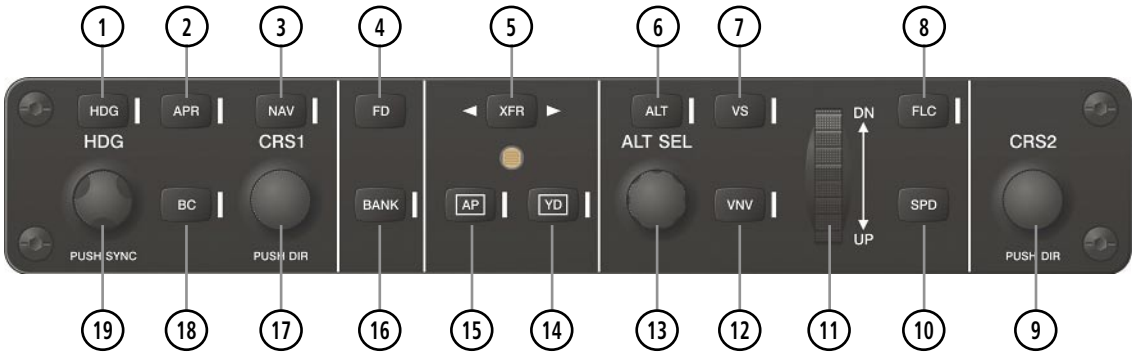


Figure 1-3 AFCS Control Unit (GMC 710)

(8) **FLC Key –** Selects/deselects Flight Level Change Mode.

(9) **CRS2 Knob –** Sets the copilot-selected course on the HSI of PFD2 when the VOR1, VOR2, or OBS/SUSP mode is selected. Pressing this knob centers the CDI on the currently selected VOR. The copilot-selected course provides course reference to the copilot-side flight director when operating in Navigation and Approach modes.

(10) **SPD Key –** Switches the Flight Level Change mode reference speed between IAS and MACH number.

(11) **NOSE UP/DN Wheel –** Controls the active mode reference for the Pitch, Vertical Speed, and Flight Level Change modes.

(12) **VNV Key –** Selects/deselects Vertical Navigation mode.

(13) **ALT SEL Knob –** Sets the selected altitude in the Selected Altitude Box. In addition to providing the standard G1000 altitude alerter function, selected altitude provides an altitude setting for the Altitude Capture/Hold mode of the AFCS.

(14) **YD Key –** Engages/disengages the yaw damper.

(15) **AP Key –** Engages/disengages the autopilot.

(16) **BANK Key –** Selects/deselects Low Bank Mode.

(17) **CRS1 Knob –** Sets the pilot-selected course on the HSI of PFD1 when the VOR1, VOR2, or OBS/SUSP mode is selected. Pressing this knob centers the CDI on the currently selected VOR. The pilot-selected course provides course reference to the pilot-side flight director when operating in Navigation and Approach modes.

(18) **BC Key –** Selects/deselects Back Course Mode.

(19) **HDG Knob –** Sets the selected heading on the HSI. When operating in Heading Select mode, this knob provides the heading reference to the flight director.

1.4 PFD SOFTKEY MAP

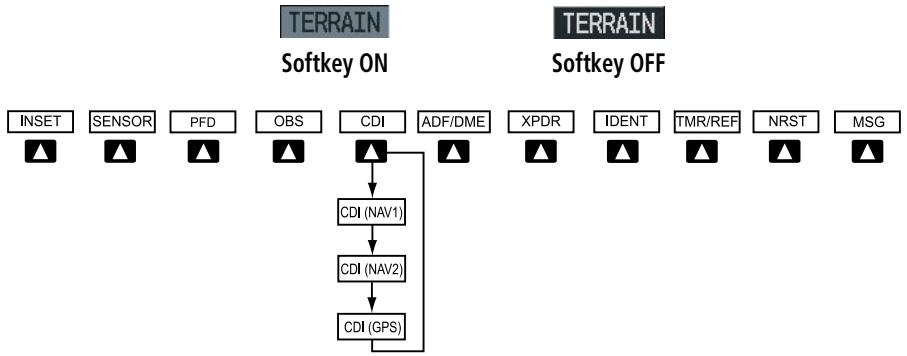


Figure 1-4 Top Level PFD Softkeys

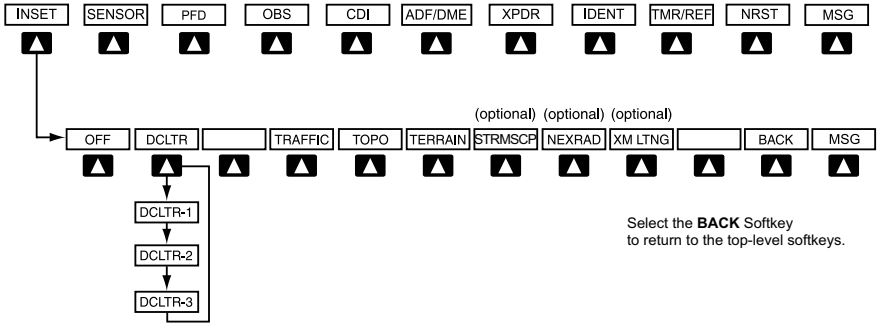


Figure 1-5 Inset Map Softkeys

INSET — Displays Inset Map in PFD lower left corner

- **OFF** — Removes Inset Map
- **DCLTR (3)** — Selects desired amount of map detail; cycles through declutter levels:
  - DCLTR (No Declutter): All map features visible
  - DCLTR-1: Declutters land data
  - DCLTR-2: Declutters land and SUA data
  - DCLTR-3: Removes everything except the active flight plan
- **TRAFFIC** — Displays traffic information on Inset Map
- **TOPO** — Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on Inset Map
- **TERRAIN** — Displays terrain information on Inset Map

NEXRAD	Displays NEXRAD weather and coverage information on Inset Map (optional feature)
XM LTNG	Displays XM lightning information on Inset Map (optional feature)

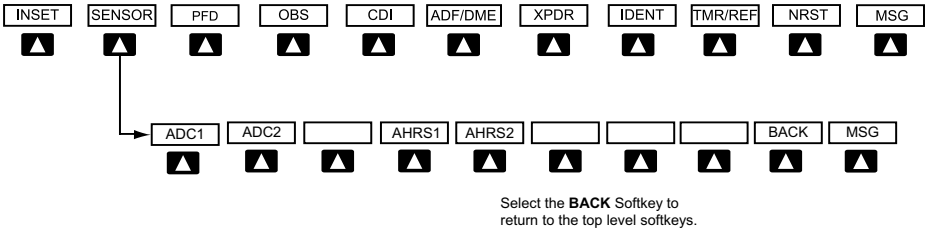


Figure 1-6 Sensor Softkeys

SENSOR	Displays softkeys for selecting the #1 and #2 AHRS and Air Data Computers
ADC1	Selects the #1 Air Data Computer
ADC2	Selects the #2 Air Data Computer
AHRS1	Selects the #1 AHRS
AHRS2	Selects the #2 AHRS

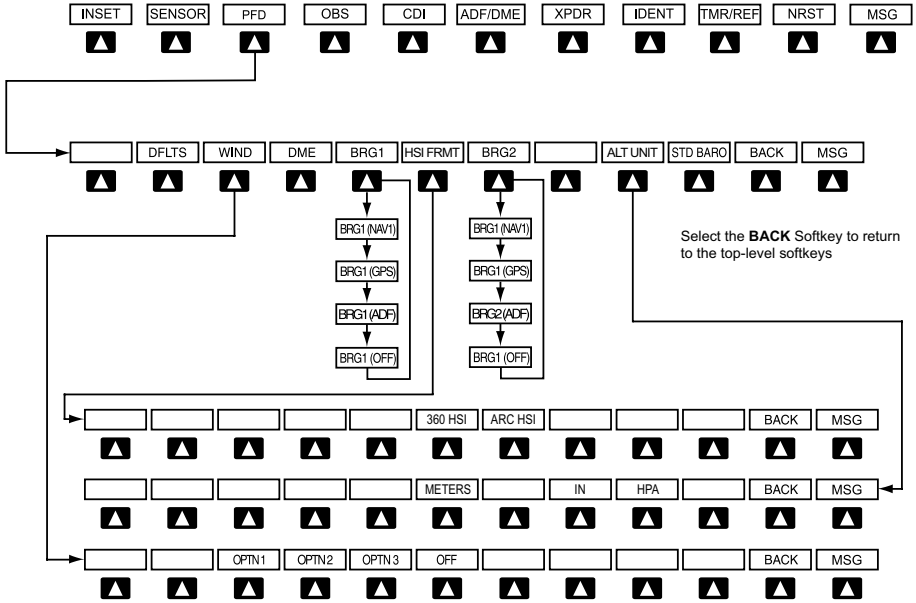


Figure 1-7 PFD Configuration Softkeys

PFD		Displays second-level softkeys for additional PFD configurations
	DFLTS	Resets PFD to default settings, including changing units to standard
	WIND	Displays softkeys to select wind data parameters
	OPTN 1	Wind direction arrows with headwind and crosswind components
	OPTN 2	Wind direction arrow and speed
	OPTN 3	Wind direction arrow with direction and speed
	OFF	Information not displayed
	BRG1	Cycles the Bearing 1 Information Window through NAV1 or GPS/ waypoint identifier and GPS-derived distance information, and ADF/ frequency.
	HSI FRMT	Provides access to the HSI formatting softkeys
	360 HSI	Displays the HSI in a 360 degree view
	ARC HSI	Displays the HSI as an arc
	BRG2	Cycles the Bearing 2 Information Window through NAV2 or GPS/ waypoint identifier and GPS-derived distance information, and ADF/ frequency.

ALT UNIT		Displays softkeys for setting the altimeter and BARO settings to metric units
	METERS	When enabled, displays altimeter in meters
	IN	Select to display the BARO setting as inches of mercury
	HPA	Select to display the BARO setting as hectopacals
STD BARO		Sets barometric pressure to 29.92 in Hg (1013 hPa)

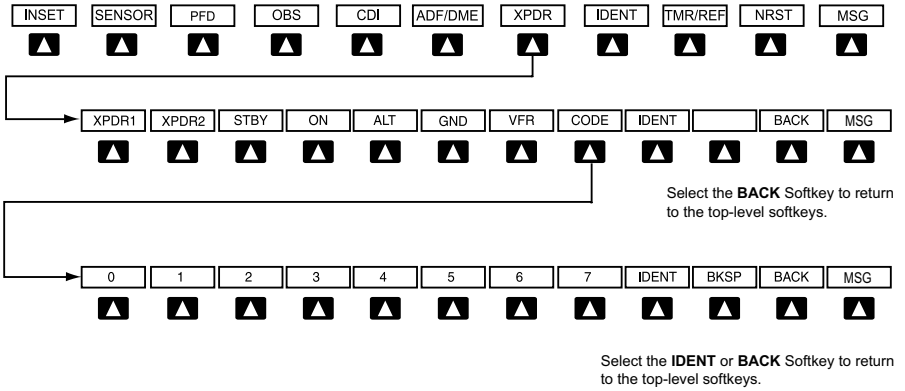


Figure 1-8 Transponder Softkeys

XPDR		Displays transponder mode selection softkeys
	XPDR1	Selects the #1 transponder as active
	XPDR2	Selects the #2 transponder as active
	STBY	Selects Standby Mode (transponder does not reply to any interrogations)
	ON	Selects Mode A (transponder replies to interrogations)
	ALT	Selects Mode C – Altitude Reporting Mode (transponder replies to identification and altitude interrogations)
	GND	Manually selects Ground Mode, the transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to discretely addressed Mode S interrogations.
	VFR	Automatically enters the VFR code (1200 in the U.S.A. only)
	CODE	Displays transponder code selection softkeys 0-7

	0 — 7	Use numbers to enter code
	BKSP	Removes numbers entered, one at a time
IDENT		Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen
TMR/REF		Displays Timer/References Window
NRST		Displays Nearest Airports Window
MSG		Displays Messages Window

1.5 MFD SOFTKEY MAP

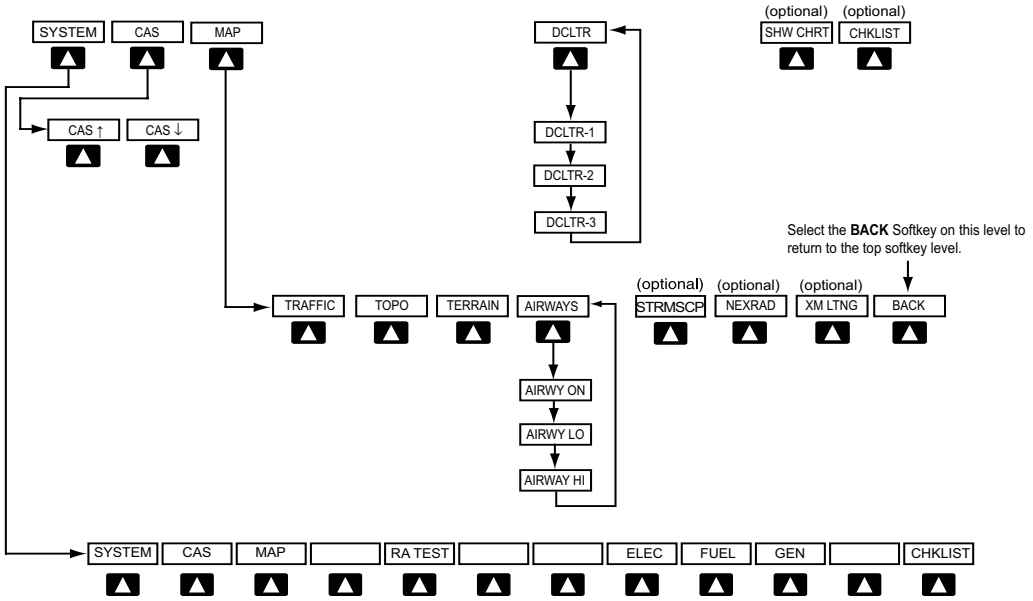


Figure 1-9 MFD Softkeys

SYSTEM		Accesses the Synoptics page softkeys
	RA TEST	Displays a value of 50 feet in the RAD ALT window indicating the system is funcitoning correctly.
	ELEC	Displays the Electrical Synoptics Page
	FUEL	Displays the Fuel Synoptics Page
	GEN	Displays the General Synoptics Page for the anti-ice system and doors

CAS		Accesses the CAS scrolling softkeys.
	CAS ↑	Scroll up (Displayed only when a sufficient number of items are displayed in the Crew Alerting System Display to warrant scrolling)
	CAS ↓	Scroll down (Displayed only when a sufficient number of items are displayed in the Crew Alerting System Display to warrant scrolling)
MAP		Enables second-level Navigation Map softkeys
	TRAFFIC	Displays traffic information on Navigation Map
	TOPO	Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on Navigation Map
	TERRAIN	Displays terrain information on Navigation Map
	AIRWAYS	Displays airways on the map; cycles through the following: AIRWAYS: No airways are displayed AIRWY ON: All airways are displayed AIRWY LO: Only low altitude airways are displayed AIRWY HI: Only high altitude airways are displayed
	STRMSCP	Displays Stormscope weather and coverage information on Navigation Map (optional feature)
	NEXRAD	Displays NEXRAD weather and coverage information on Navigation Map (optional feature)
	XM LTNG	Displays XM lightning information on Navigation Map (optional feature)
	BACK	Returns to top-level softkeys
DCLTR (3)		Selects desired amount of map detail; cycles through declutter levels: DCLTR (No Declutter): All map features visible DCLTR-1: Declutters land data DCLTR-2: Declutters land and SUA data DCLTR-3: Removes everything except the active flight plan
SHW CHRT		When available, displays optional airport and terminal procedure charts
CHKLIST		When available, displays optional checklists

1.6 MFD PAGE GROUPS

1) Turn the large **FMS** Knob until the desired page group is selected.
2) Turn the small **FMS** Knob to select pages within the group. See Figure 1-10.

Figure 1-10 Page Group Icon

1.7 VERTICAL NAVIGATION

One of two altitude sources is used by the G1000 when giving vertical navigation guidance. WAAS GPS altitude is used when giving guidance for a WAAS approach. Baro corrected altitude is used when vertical guidance is given in all other situations.

The G1000 system can use altitude constraints associated with lateral waypoints to give guidance for vertical navigation. These altitudes are, depending on the specific instance, entered by the pilot or retrieved from the published altitudes in the navigation database.

The navigation database only contains altitudes for procedures that call for "Cross at" altitudes. If the procedure states "Expect to cross at," the altitude is not be in the database. In this case the altitude may be entered manually.

NOTE: *All arrival procedure altitudes contained in the navigation database are for turbojet aircraft only. Alter or enter altitudes as desired to comply with the ATC clearance.*

When activating or loading an arrival or approach procedure into an active flight plan, the VNV 'ALT' fields are populated with any altitudes that can be retrieved from the navigation database.

Since altitudes loaded with an arrival procedure are published only for turbojet aircraft, the altitudes are displayed as white text indicating that the altitudes are displayed for reference only. An arrival waypoint altitude may be used (or "designated") as is, or changed to a different altitude. An altitude is designated by pressing the **FMS** Knob and turning the large **FMS** Knob to place the cursor on the desired altitude and pressing the **ENT** Key or entering a different value and pressing the **ENT** Key. The altitude is now displayed as blue text, indicating that the altitude is now designated to give vertical speed and deviation guidance.

Approach waypoint altitude constraints are designated in the same way as previously described for arrivals. These altitudes are also displayed as blue text after being designated for use. Waypoint altitude constraints may be designated up to, but not including the FAF. The FAF is always a "reference only" altitude and cannot be designated, unless the selected approach does not provide vertical guidance. In this case, the FAF altitude can be designated.

	White Text	Light Blue Text	Light Blue Subdued Text
Large Text	Altitude calculated by the system estimating the altitude of the aircraft as it passes over the navigation point. This altitude is provided as a reference and is not designated to be used in determining vertical speed and deviation guidance.	Altitude has been entered by the pilot. Altitude is designated for use in giving vertical speed and deviation guidance. Altitude does not match the published altitude in navigation database or no published altitude exists.	The system cannot use this altitude in determining vertical speed and deviation guidance.
Small Text	Altitude is not designated to be used in determining vertical speed and deviation guidance. Altitude has been retrieved from the navigation database and is provided as a reference.	Altitude is designated for use in giving vertical speed and deviation guidance. Altitude has been retrieved from the navigation database or has been entered by the pilot and matches a published altitude in the navigation database.	The system cannot use this altitude in determining vertical speed and deviation guidance.

Table 1-1 VNV Altitude Text Size and Color

Altitudes that have been designated for use in vertical guidance may also be made "non-designated" by placing the cursor over the desired altitude and pressing the **CLR** Key. Other displayed altitudes may change due to re-calculations or rendered invalid as a result of manually changing an altitude to a non-designated altitude.

To help interpret the meanings of how the altitudes are presented, keep the following points in mind:

- When the altitude is displayed in light blue, the system is using that altitude (designated) to determine vertical speed and deviation guidance.
- When the altitude is displayed in white, it is not being used by the system (non-designated) to determine the vertical speed and deviation guidance.
- An altitude displayed as small text is an altitude that is published in the navigation database.
- Altitudes displayed as a light blue subdued text cannot be used in the current vertical navigation calculations.

Figure 1-11 VNV Altitudes

Some altitudes retrieved from the database have associated restrictions indicating to stay 'At', 'At or Above', or 'At or Below' a specific altitude. These restrictions are indicated using a 'bar' above and/or below the appropriate altitude as shown in Figure 1-9.

Figure 1-12 Altitude Restrictions

See Section 7 - Navigation, for a sample flight plan which further illustrates vertical navigation in more detail.

1.8 BACKLIGHTING

Manually adjust the backlight for the PFD and MFD:

1) Press the **MENU** Key on the PFD to display the PFD Setup Menu window.
2) Press the small **FMS** Knob to activate the cursor. 'PFD DSPL > AUTO' is now highlighted.
3) Turn the small **FMS** Knob to display the selection window.
4) Turn the **FMS** Knob to select 'MANUAL', then press the **ENT** Key.
5) With the intensity value now highlighted, turn the small **FMS** Knob to select the desired backlighting.
6) Turn the large **FMS** Knob to highlight 'MFD DSPL > AUTO' and repeat steps 3 through 5.

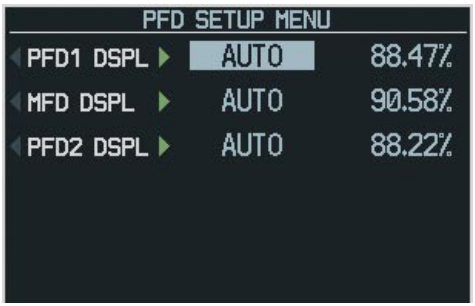


Figure 1-13 PFD Setup Menu Window

1.9 DATABASE UPDATES

The G1000 system uses Secure Digital (SD) cards to load and store various types of data. For basic flight operations, SD cards are required for database storage as well as Jeppesen aviation and ChartView database updates.

Jeppesen Aviation Database

NOTE: *After the aviation database is installed, the card may be removed after loading the update to each LRU.*

Updating the Jeppesen aviation database:

1) With the G1000 System OFF, insert the SD card containing the aviation database update into the top card slot of the PFD to be updated (Label of SD card facing left).
2) Turn the G1000 System ON. A prompt similar to the following is displayed in the upper left corner of the PFD:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
            FROM              TO
REGION:     WORLDWIDE         WORLDWIDE
CYCLE:      0604              0605
EFFECTIVE:  13-APR-2006       11-MAY-2006
EXPIRES:    11-MAY-2006       08-JUN-2006

NO WILL BE ASSUMED IN 8 SECONDS.
```

Figure 1-14 Database Update Prompt

3) Press the **ENT** Key to start the database update. A prompt similar to the following is displayed:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
            FROM            TO
REGION:     WORLDWIDE       WORLDWIDE
CYCLE:      0604            0605
EFFECTIVE:  13-APR-2006     11-MAY-2006
EXPIRES:    11-MAY-2006     08-JUN-2006

NO WILL BE ASSUMED IN 8 SECONDS.
UPDATING AVIATION DATABASE, PLEASE WAIT.
.
UPDATED 1 FILES SUCCESSFULLY!
PRESS ANY KEY TO CONTINUE.
CONTINUING IN 8 SECONDS.
```

Figure 1-15 Database Update Confirmation

4) After the update completes, the PFD starts in normal mode.

5) Turn the G1000 System OFF and remove the SD card.

6) Repeat steps 1 through 4 for the MFD. The MFD and PFD databases are now updated. Remove the SD card when finished.

7) Verify that the correct update cycle is loaded during startup of the MFD.

Garmin Databases

Since these databases are not stored internally in the MFD or PFD, a Supplemental Data Card containing identical database versions must be kept in each display unit.

NOTE: *The data contained in the terrain and obstacle databases comes from government agencies. Garmin accurately processes and cross-validates the data, but cannot guarantee the accuracy and completeness of the data.*

1) Insert one SD card in the bottom card slot of the MFD and one in the bottom card slot of the PFD. The SD card containing the ChartView or FliteCharts database must be inserted into the bottom slot on the MFD.

2) Apply power to the G1000 System. View the MFD power-up splash screen. Check that the databases are initialized and displayed in the window of the splash screen. When updating the terrain and FliteCharts databases, an 'in progress' message may be seen. If this message is present, wait for the system to finish loading before verifying the correct databases are initialized, then proceed to step 3.

DATABASE
Checklist File: N/A
Basemap Land 1.01
SafeTaxi Expires 28-SEP-2006
Terrain 2.04
Airport Terrain 2.04
Obstacle Expires 28-SEP-2006
Aviation Expires 28-SEP-2006
FliteCharts Expires 28-SEP-2006
All map and terrain data provided is only to be used as a general reference to your surrounding and as an aid to situational awareness.
PILOT PROFILE
SAM
Press FMS knob to change profile
Press "ENT" or rightmost softkey to continue

Figure 1-16 Power-Up Splash Screen Window

3) Acknowledge the Power-up Page agreement by pressing the **ENT** Key or the right most softkey.

4) At the MAP – NAVIGATION MAP Page, select the **MAP** Softkey and check to make sure that the **TOPO** and **TERRAIN** Softkeys are available (not dimmed) and other database features are functioning.

5) Power down the G1000.

1.10 PILOT PROFILES

Figure 1-17 Pilot Profiles on AUX-System Setup Page

Creating a Profile

1) Select the AUX - System Setup Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'CREATE' in the Pilot Profile Box.
4) Press the **ENT** Key. A 'Create Profile' window is displayed.
5) Use the **FMS** Knob to enter a profile name
6) Press the **ENT** Key.
7) In the next field, use the small **FMS** Knob to select the desired settings upon which to base the new profile.
8) Press the **ENT** Key.
9) With 'CREATE' highlighted, press the **ENT** Key to create the profile.

Selecting a Profile

1) Select the AUX - System Setup Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the active profile field in the Pilot Profile Box.
4) Turn the small **FMS** Knob to display the pilot profile list and highlight the desired profile.
5) Press the **ENT** Key. The G1000 loads and displays the system settings for the selected profile.

Renaming a Profile

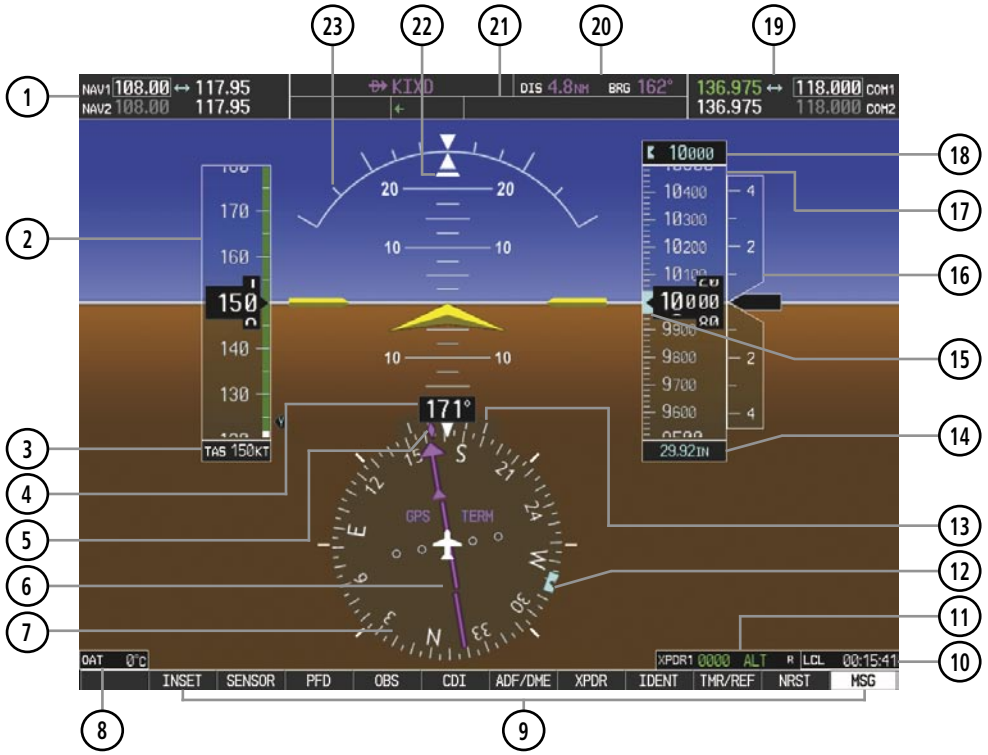
1) Select the AUX - System Setup Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'RENAME' in the Pilot Profile Box.
4) Press the **ENT** Key.
5) In the 'Rename Profile' window, turn the **FMS** Knob to select the profile to rename.
6) Press the **ENT** Key.
7) Use the **FMS** Knob to enter a new profile name up to 16 characters.
8) Press the **ENT** Key.
9) With 'RENAME' highlighted, press the **ENT** Key.

Deleting a Profile

1) Select the AUX - System Setup Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'DELETE' in the Pilot Profile Box.
4) Press the **ENT** Key.
5) In the 'Delete Profile' window, turn the **FMS** Knob to select the profile to be deleted.
6) Press the **ENT** Key.
7) With 'DELETE' highlighted, press the **ENT** Key.

SECTION 2: FLIGHT INSTRUMENTS

The following discussions pertain to the Primary Flight Display, unless otherwise indicated.



1. *NAV Frequency Box*
2. *Airspeed Indicator*
3. *True Airspeed*
4. *Current Heading*
5. *Current Track Bug*
6. *Course Deviation Indicator (CDI)*
7. *Horizontal Situation Indicator (HSI)*
8. *Outside Air Temperature*
9. *Softkeys*
10. *System Time*
11. *Transponder Status Box*
12. *Selected Heading Bug*
13. *Turn Rate Indicator*
14. *Barometric Altimeter Setting*
15. *Selected Altitude Bug*
16. *Vertical Speed Indicator (VSI)*
17. *Altimeter*
18. *Selected Altitude*
19. *COM Frequency Box*
20. *Navigation Status Box*
21. *AFCS Status Box*
22. *Slip/Skid Indicator*
23. *Attitude Indicator*

Figure 2-1 Default PFD Information

1. *AFCS Status Annunciation*
2. *Traffic Annunciation*
3. *Vspeed References*
4. *Radar Altimeter Indication*
5. *Selected Heading Window*
6. *Wind Data Window*
7. *Inset Map*
8. *BRG1 Information Window*
9. *DME Information Window*
10. *BRG2 Information Window*
11. *Flight Plan Window*
12. *Barometric/Radar Altimeter Minimums Window*
13. *Selected Course Window*
14. *Altitude Reference Bug*
15. *Barometric/Radar Altimeter Minimums Bug*
16. *Vertical Deviation/Glidepath/Glideslope Indicator*

Figure 2-2 Additional PFD Information

Figure 2-3 PFD Navigation Status Box

2.1 AIRSPEED INDICATOR

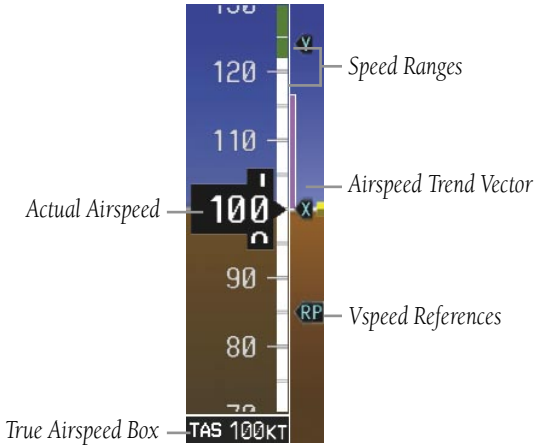


Figure 2-4 Airspeed Indicator

Speed Indication

The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots. Minor tick marks are at intervals of 5 knots. Speed indication starts at 20 knots. High speed awareness is represented by a red and white 'barber pole'. If the airspeed trend vector reaches the 'barber pole', the digits in the pointer turn yellow. If the airspeed pointer reaches the 'barber pole', the pointer turns red (refer to Figure 2-5).

Figure 2-5 Red Pointer

Low speed awareness is represented by a red speed range. Refer to the Pilot's Operating Handbook (POH) for speed criteria.

Airspeed Trend Vector

The end of the trend vector displays approximately what the airspeed will be in 6 seconds if the current rate of acceleration/deceleration is maintained.

Vspeed References

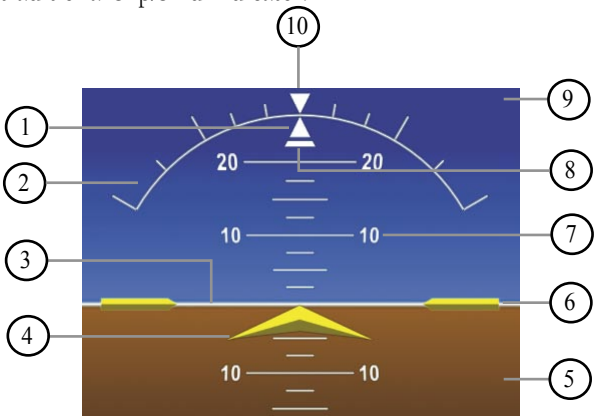
Vspeeds are set using the **TMR/REF** Softkey. When active (ON), the Vspeeds are displayed at their respective locations to the right of the airspeed scale.

True Airspeed Box

The True Airspeed box is located below the Airspeed indicator and displays the true airspeed in knots.

2.2 ATTITUDE INDICATOR

The Slip/Skid Indicator is located under the roll pointer and moves laterally away from the pointer to indicate lateral acceleration. One Slip/Skid indicator displacement is equal to one ball displacement when compared to a traditional slip/skid indicator.



1. Roll Pointer
2. Roll Scale
3. Horizon Line
4. Aircraft Symbol
5. Land Representation
6. Aircraft Wing Tips
7. Pitch Scale
8. Slip/Skid Indicator
9. Sky Representation
10. Roll Scale Zero

Figure 2-6 Attitude Indicator

2.3 ALTIMETER

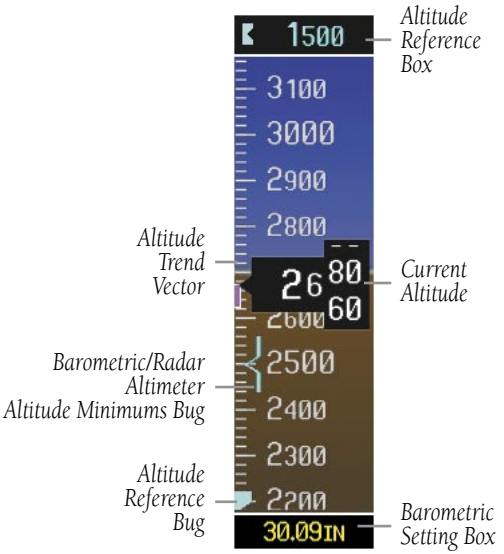


Figure 2-7 Altimeter

Altitude Reference Bug

The Altitude Reference Bug is displayed at the Selected Altitude or the edge of the tape (whichever is closer to the current altitude) to provide increased altitude awareness and to set the desired hold altitude for the autopilot.

Set the Altitude Reference Bug:

Turn the **ALT** Knobs to set the Altitude Reference Bug. The small **ALT** Knob sets the hundreds and the large **ALT** Knob sets the thousands. This altitude also appears in the Altitude Reference Box above the Altimeter.

Altitude Trend Vector

The end of the trend vector displays approximately what the altitude will be in 6 seconds if the current rate of vertical speed is maintained.

Barometric Setting Box

Select barometric pressure:

Turn the **BARO** Knob to select the desired setting.

Quickly enter standard pressure:

1) Select the **PFD** Softkey.
2) Select the **STD BARO** Softkey.

Synchronizing Altimeter Baro Settings

1) Select the AUX - System Setup Page using the **FMS** Knob.
2) Press the **FMS** Knob to activate the cursor. 'Time Format' is highlighted.
3) Turn the large **FMS** Knob to highlight the 'Baro Sync' ON/OFF field.
4) Turn the small **FMS** Knob clockwise to ON or counterclockwise to OFF.
5) Press the **FMS** Knob to remove the cursor.

Altitude Alerting

Figure 2-8 Altitude Alerting Visual Annunciations

Visual annunciations appear in the Altitude Reference Box. Whenever the setting is changed, the Altitude Alerter is reset. The Altitude Alerter is independent of the Automatic Flight Control System.

Barometric Transition Altitude Alert

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.

2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight 'Altitude' in the 'Baro Transition Alert' box.
4) Turn the small **FMS** Knob to turn the alert OFF or ON and press the **ENT** Key.
5) Turn the small **FMS** Knob to change the altitude and press the **ENT** Key.
6) To cancel the selection, press the **FMS** Knob.

Metric Display

Display altitude in meters and barometric pressure in hectopascals:

1) Select the **PFD** Softkey to display the second level softkeys.
2) Select the **ALT UNIT** Softkey.
3) Select the **METRIC** Softkey to display altitude in meters.
4) Select the **HPA** Softkey to display the barometric setting in hectopascals. Select the **IN** Softkey to display the barometric setting in inches of mercury.
5) Select the **BACK** Softkey to return to the previous level softkeys.

Figure 2-9 Altimeter (Metric)

Low Altitude Annunciation

NOTE: *The LOW ALT annunciation is not available when the G1000 is configured with TAWS (Terrain Awareness & Warning System), unless TAWS is inhibited.*

When the Final Approach Fix (FAF) is the active waypoint in a GPS WAAS approach using vertical guidance, a LOW ALT (Low Altitude) annunciation may appear if the current aircraft altitude is at least 164 feet below the prescribed altitude at the FAF. The annunciation initially flashes. After a few seconds the flashing stops and the annunciation is displayed as shown in Figure 2-10.

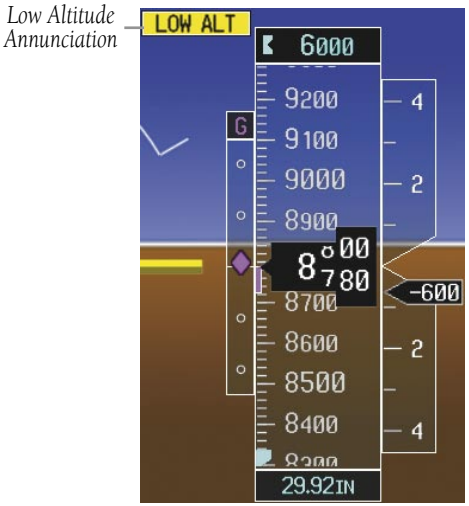


Figure 2-10 Low Altitude on GPS Approach

2.4 VERTICAL DEVIATION/GLIDEPATH/ GLIDESLOPE INDICATOR

NOTE: *VNV altitudes displayed on the Active Flightplan Page must be designated for use in vertical guidance.*

The Vertical Deviation and Required Vertical Speed Indicators appear when vertical guidance is being given prior to executing an approach (see Figure 2-11). The Glidepath Indicator appears at a point prior to the FAF when executing an LPV, LNAV/VNAV, or LNAV+V approach (see Figure 2-12).

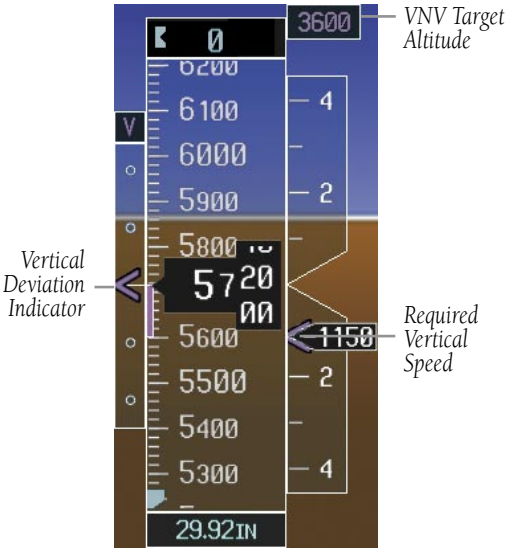


Figure 2-11 Vertical Deviation Indications

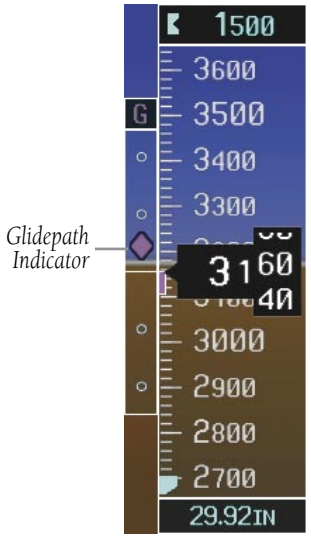


Figure 2-12 Glidepath Indicator

The Glideslope Indicator appears when an ILS approach has been activated and an ILS is tuned in the active NAV receiver field (see Figure 2-13).

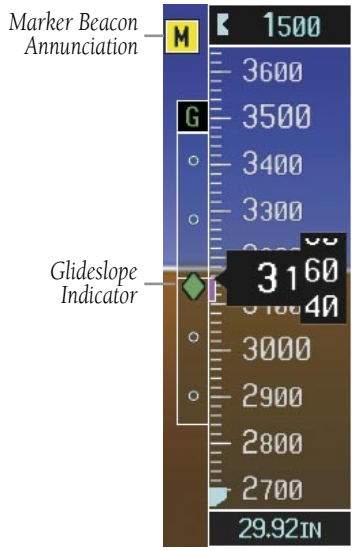


Figure 2-13 Glideslope Indicator

2.5 MARKER BEACON ANNUNCIATIONS

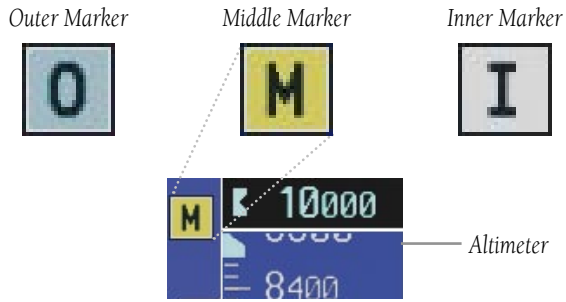


Figure 2-14 Marker Beacon Annunciations

2.6 VERTICAL SPEED INDICATOR

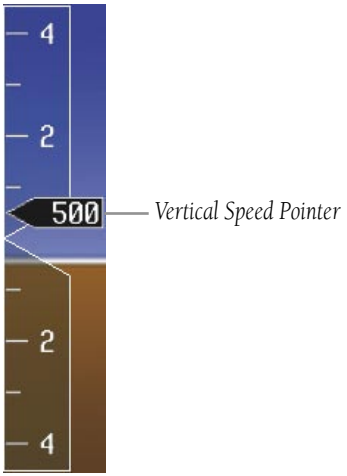


Figure 2-15 Vertical Speed Indicator

The actual vertical speed is displayed inside the pointer.

2.7 BAROMETRIC/RADAR ALTITUDE MINIMUMS

The desired barometric/radar altitude minimums can be set in the Timer/References Window. The altitude ranges from 0 to 16,000 feet in 10-foot increments. The minimums are reset anytime the power is cycled.

Figure 2-16 Barometric/Radar Minimum Descent Altitude Settings

The desired barometric/radar minimum descent altitude (MDA, or Decision Height, DH) can be set in the Timer/References Window.

Visual annunciations alert the pilot when approaching the MDA:

- When the aircraft altitude descends to within 2500 feet of the MDA setting, the BARO MIN or RA MIN Box (depending on the selected source) appears with the altitude in light blue text. The bug appears on the tape in light blue once in range.
- When the aircraft passes through 100 feet of the MDA, the bug and text turn white.
- Once the aircraft descends past the MDA, the bug and text turn yellow and the aural alert, "Minimums Minimums", is generated.

Alerting is inhibited while the aircraft is on the ground. If the aircraft climbs after having reached the MDA, once it reaches 50 feet above the MDA, alerting is disabled.

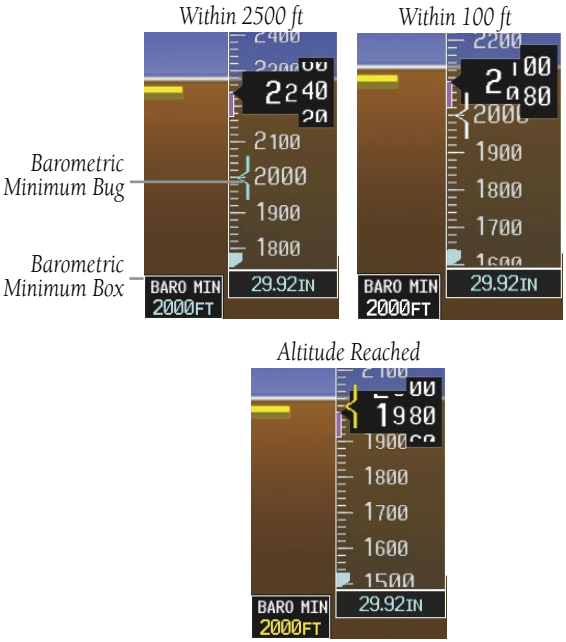


Figure 2-17 Barometric Minimum Descent Altitude Alerting Visual Annunciations

Set the barometric altitude minimums:

1) From the Timer References Window, turn the large **FMS** Knob to highlight the source field.
2) Turn the small **FMS** Knob in the direction of the green arrow to select BARO (barometric altimeter) or RAD ALT (radar altimeter) as the altitude source.
3) Turn the large **FMS** Knob to select the altitude field.
4) Turn the small **FMS** Knob to select the desired altitude minimums and press the **ENT** Key.

2.8 RADAR ALTITUDE

When RAD ALT is selected as the altitude source in the Timer/References window, radar altitude is automatically displayed when the aircraft is within the display range of -40 to 2,500 feet. Radar altitude is displayed as shown in Figure 2-18. The indication changes to yellow when the aircraft is below the selected minimum altitude.

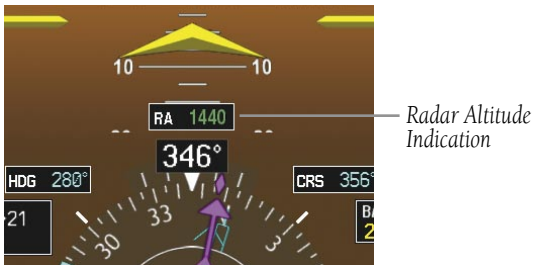


Figure 2-18 Radar Altitude

Testing the Radar Altimeter:

1) Select the **SYSTEM** Softkey on the MFD.
2) Select the **RA TEST** Softkey. The Radar Altitude window displays 50 feet, indicating a properly functioning system.
3) Selecting the **RA TEST** Softkey again, or exiting the System Page cancels the test.

2.9 WIND DATA

When the window is selected for display, but wind information is invalid or unavailable, the window shows "NO WIND DATA". Wind data can be displayed in three different ways:

- Wind direction arrows with headwind and crosswind components (Option 1)
- Wind direction arrow and speed (Option 2)
- Wind direction arrow with direction and speed (Option 3)

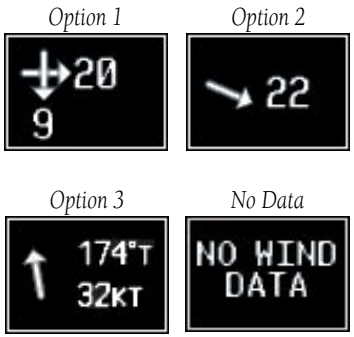
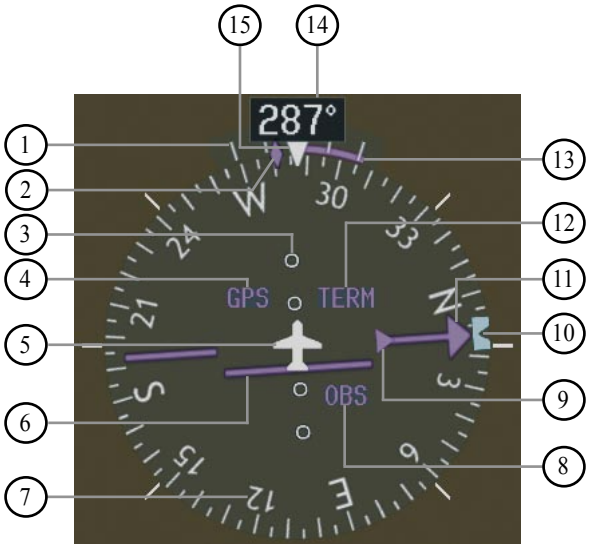


Figure 2-19 Wind Data Window

Displaying wind data:

1) Select the **PFD** Softkey.
2) Select the **WIND** Softkey to display wind data below the Selected Heading.
3) Select one of the **OPTN** softkeys to change how wind data is displayed.
4) To remove the Wind Data Window, select the **OFF** Softkey.

2.10 HORIZONTAL SITUATION INDICATOR (HSI)



1. *Turn Rate Indicator*
2. *Ground Track Bug*
3. *Lateral Deviation Scale*
4. *Navigation Source*
5. *Aircraft Symbol*
6. *Course Deviation Indicator*
7. *Rotating Compass Rose*
8. *OBS Mode*
9. *TO/FROM Indicator*
10. *Heading Bug*
11. *Course Pointer*
12. *Flight Phase*
13. *Turn Rate and Heading Trend Vector*
14. *Heading*
15. *Lubber Line*

Figure 2-20 Horizontal Situation Indicator

Turn Rate Indicator and Heading Trend Vector

Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta turn rate trend vector shows the current turn rate. The end of the trend vector gives the heading predicted in six seconds, based on the present turn rate. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.

Figure 2-21 Turn Rate Indicator and Trend Vector

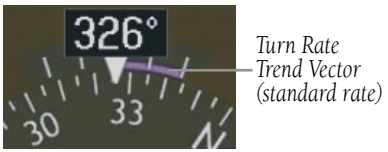


Figure 2-22 Standard-Rate Turn Indication

Course Pointer

The Course Pointer is a single line arrow (GPS, VOR1 and LOC1) or double line arrow (VOR2 and LOC2) which points in the direction of the set course.

Figure 2-23 Course Pointer

Course Deviation Indicator (CDI)

The CDI scale automatically adjusts to the current phase of flight as seen in Figure 2-24. Scaling may be selected manually from the MFD System Setup Page.

Flight Phase	Automatic CDI Full-scale Deflection
Departure (DRPT)	0.3 nm
Terminal (TERM)	1.0 nm
Enroute (ENR)	2.0 nm
Oceanic (OCN)	2.0 nm
Approach (LNAV)	1.0 nm decreasing to 350 feet depending on variables (see Figure 2-25)
Approach (LNAV+V)	
Approach (LNAV/VNAV)	1.0 nm decreasing to a specified course width, then 0.3 nm, depending on variables (see Figure 2-26)
Approach (LPV)	
Missed Approach	0.3 nm

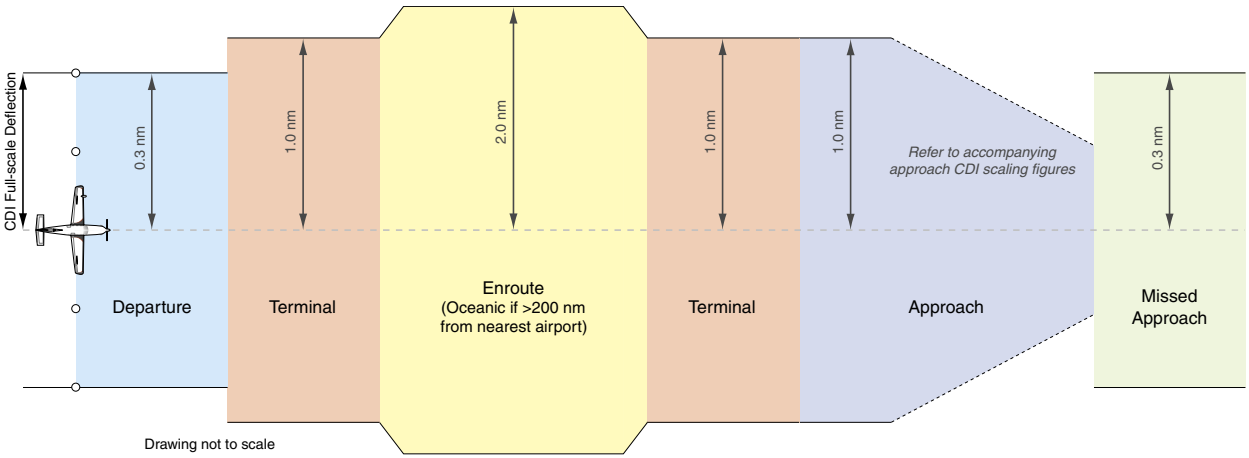


Figure 2-24 Phases of Flight/CDI Scaling

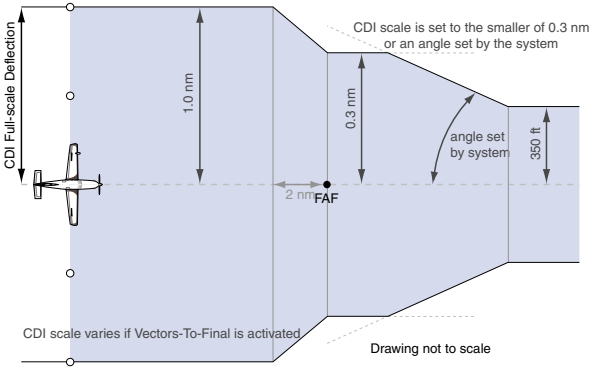


Figure 2-25 Typical LNAV and LNAV+V Approach CDI Scaling

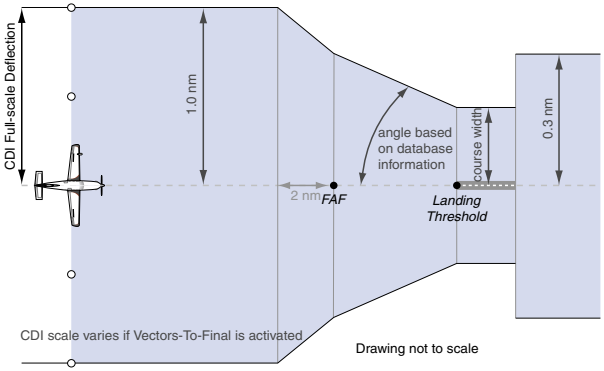


Figure 2-26 Typical LNAV/VNAV and LPV Approach CDI Scaling

Synchronizing the CDIs

1) Select the AUX - System Setup Page using the **FMS** Knob.
2) Press the **FMS** Knob to activate the cursor. 'Time Format' is highlighted.
3) Turn the large **FMS** Knob to highlight the 'CDI Sync' ON/OFF field.
4) Turn the small **FMS** Knob clockwise to ON or counterclockwise to OFF.
5) Press the **FMS** Knob to remove the cursor.

Bearing Pointers and Information Windows

Selecting the **PFD** Softkey provides access to the **BRG1** and **BRG2** Softkeys. The BRG1 Pointer is a single line pointer. The BRG2 Pointer is a double line pointer.

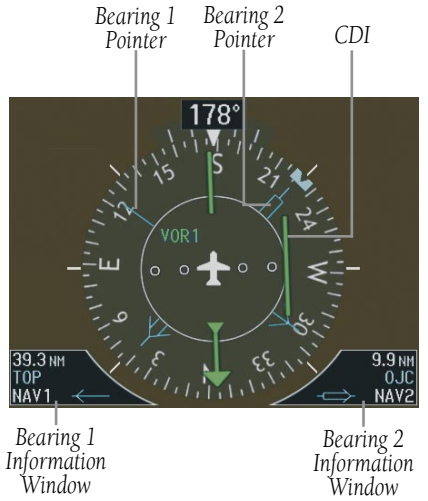


Figure 2-27 HSI with Bearing Information

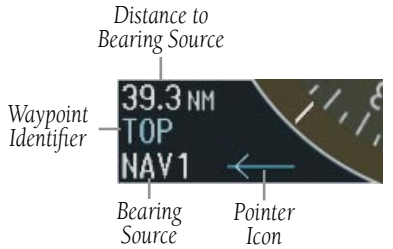


Figure 2-28 BRG1 Information Window

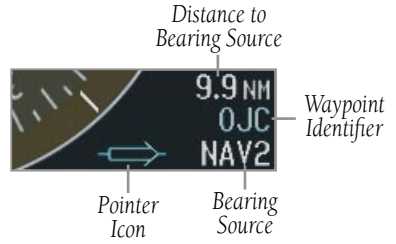


Figure 2-29 BRG2 Information Window

DME (optional)

To display the DME Information Window, select the **PFD** Softkey followed by the **DME** Softkey.

Figure 2-30 DME Information Window

Navigation Source

Change navigation sources:

1) Select the **CDI** Softkey to change from GPS to VOR1/LOC1.
2) Select the **CDI** Softkey again to change from VOR1/LOC1 to VOR2/LOC2.
3) Select the **CDI** Softkey a third time to return to GPS.

When using GPS as the navigation source, the following may appear:

- LOI - GPS position integrity is inadequate for the current procedure being flown. If GPS is being used as primary navigation, and LOI is annunciated, other means of primary navigation is required, such as VHF. LOI is also displayed during GPS position initialization.
- WARN – GPS detects a position error.
- SUSP – Displayed when in OBS Mode indicating GPS waypoint sequencing is suspended.
- DR – Navigating using Dead Reckoning due to an error in the GPS solution.

Figure 2-31 GPS LOI, GPS SUSP, LOC1 and VOR2

Enable/disable OBS Mode while navigating with GPS:

1) Select the **OBS** Softkey to select OBS Mode.
2) Turn the **CRS** Knob to select the desired course to/from the waypoint.
3) Select the **OBS** Softkey again to disable OBS Mode.

NOTE: *The **OBS** Softkey is only displayed when navigating an active leg using GPS.*

2.11 GENERIC TIMER

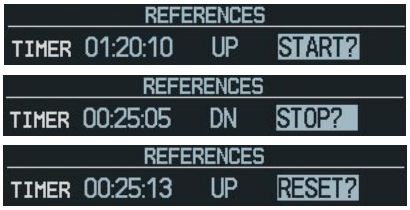


Figure 2-32 Timer Status Prompts

Change the Generic Timer:

1) Select the **TMR/REF** Softkey, then turn the large **FMS** Knob to select the time field (hh/mm/ss). Turn the **FMS** Knobs to set the desired time, then press the **ENT** Key. The UP/DOWN field is now highlighted.
2) Turn the small **FMS** Knob to display the UP/DOWN window. Turn the **FMS** Knob to select 'UP' or 'DOWN', then press the **ENT** Key. 'START?' is now highlighted.
3) Press the **ENT** Key to START, STOP, or RESET the timer (if the timer is counting DOWN, it must be reset manually). Press the **CLR** Key or the **TMR/REF** Softkey to remove the window.

Blank Page

SECTION 3: ENGINE & AIRFRAME SYSTEMS

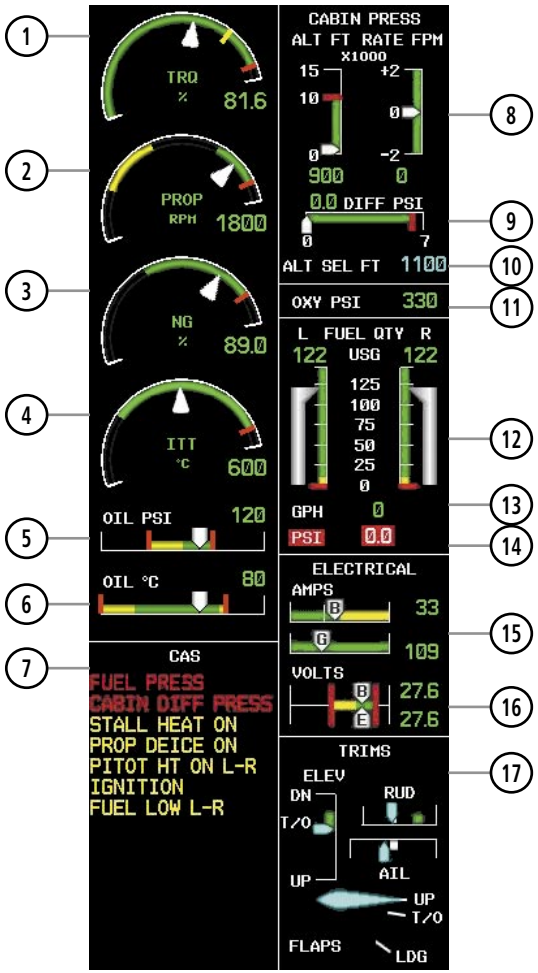


Figure 3-1 EIS Display (Normal Mode)

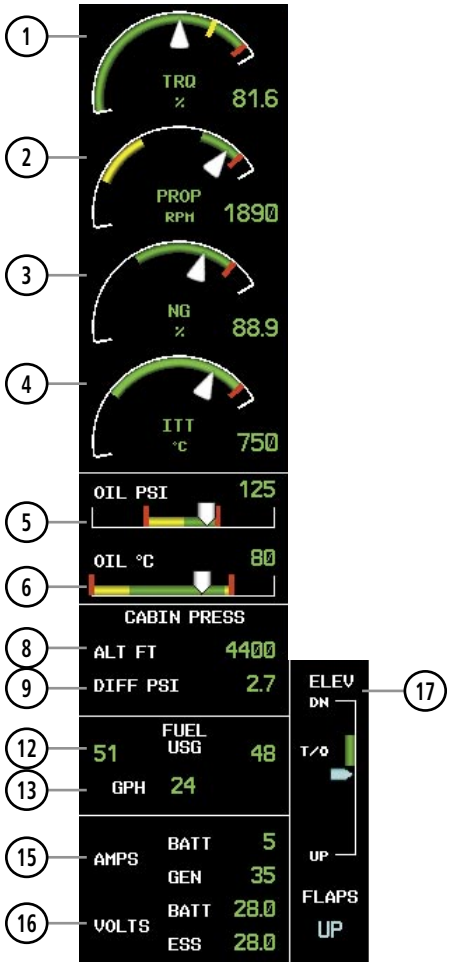


Figure 3-2 EIS Display (Reversionary Mode)

1. *Torque*
2. *Propeller Speed*
3. *Generator Speed*
4. *Interturbine Temperature*
5. *Oil Pressure*
6. *Oil Temperature*
7. *CAS Display*
8. *Cabin Pressure Altitude and Change Rate*
9. *Differential Pressure*
10. *Selected Cabin Altitude*
11. *Oxygen Pressure*
12. *Fuel Quantity*
13. *Fuel Flow*
14. *Fuel Pressure*
15. *Battery and Generator Currents*
16. *Battery and Essential Bus Voltages*
17. *Elevator, Aileron, and Rudder Trim and Flap Position*

Green ranges on the instrument scales indicate normal ranges of operation; yellow and red bands indicate caution and warning, respectively. During normal operating conditions, an instrument's pointer appears in white and the readout text is green. When data is out of the range of the indicator or gauge, the pointer moves to the end of the scale; readouts display as "___".

Temperatures above which warnings occur are indicated by red tick marks along the ITT Gauge.

The optimum cruise range is displayed on the Torque Gauge as a white band, while the maximum climb torque bug is indicated by a white triangle

3.1 ELECTRICAL SYSTEM

Pressing the **SYSTEM** Softkey displays the softkeys for the synoptics system. Press the **ELEC** Softkey to display the Electrical System Page.

The generators, ground power supply (GPU), batteries, and buses are shown in green to denote normal operation. Color of the units change depending on the condition.

1. *Standby Generator*
2. *Main Generator*
3. *Ground Power Unit Door*
4. *Battery*
5. *Main Bus*
6. *Emergency Switch*
7. *Battery Bus*
8. *Essential Bus*
9. *Power Buses*

Figure 3-3 Electrical Synoptics Page

Active generator currents are displayed below the generator icons. A disconnected generator is indicated in gray; the current is removed from the display and the switch symbol is closed.

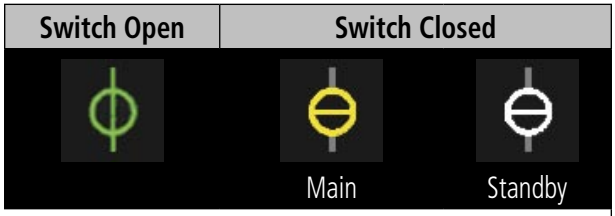


Table 3-1 Generator Switch Status

GPU status information is removed from the electrical diagram when the GPU door is closed. If the GPU door is open and selected, the GPU status is shown in green; when the door is open, but not selected, the status is shown in gray with the switch closed. A CAS message, 'GPU DOOR' is generated if the GPU door is open.

Battery connection status to the main bus is indicated in green; direction of current flow is indicated with an arrow next to the current readout. If the battery is disconnected from the main bus, the switch is closed. Battery overheating is indicated in red with a 'BAT OVHT' annunciation; a CAS message is also generated.

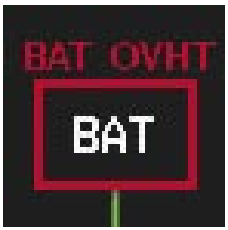


Figure 3-4 Cabin Leak Indication

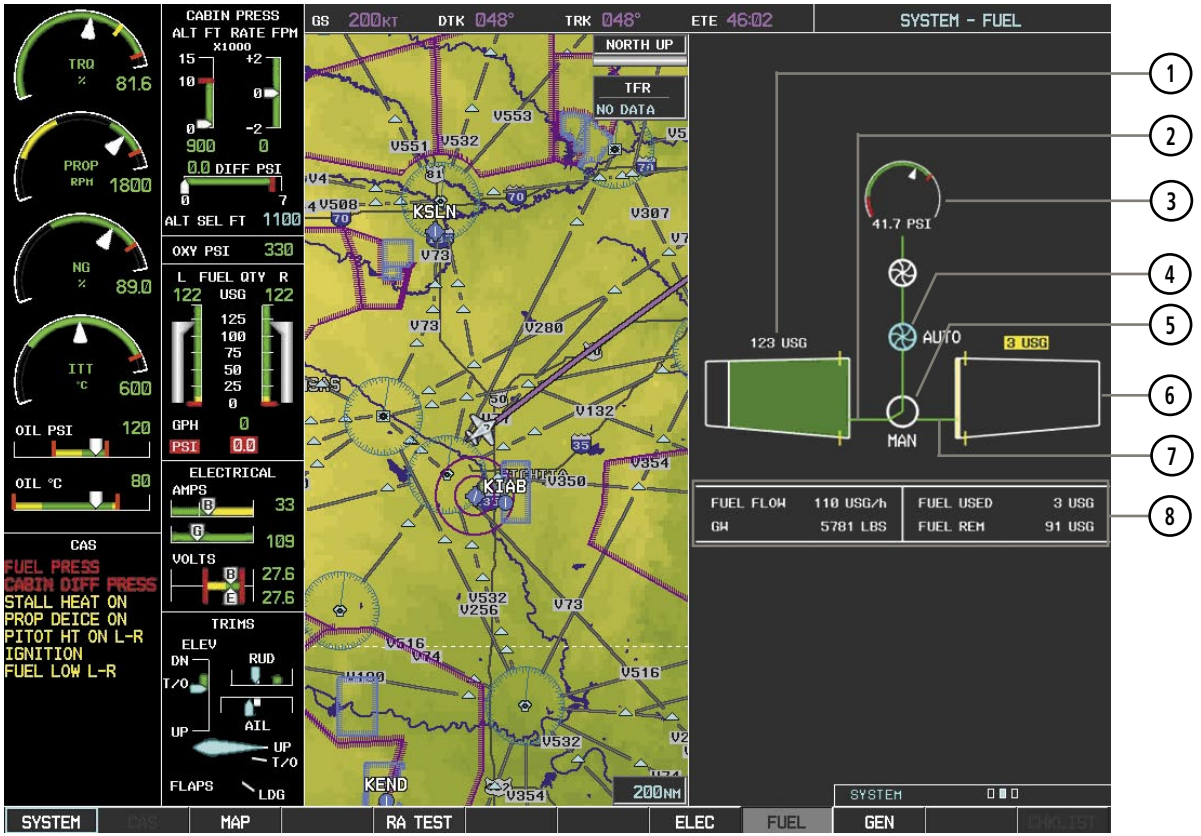
Battery and essential bus voltages are displayed using gauges. Power buses are shown in green when energized. When not energized, the connection line to the main bus is removed and the bus label is displayed in red.

A red "X" over a component indicates invalid data or a failed unit.

3.2 FUEL SYSTEM

Pressing the **SYSTEM** Softkey displays the softkeys for the synoptics system. Press the **FUEL** Softkey to display the Fuel System Page.

The Fuel Synoptics Page displays the status of the fuel tanks and feed system. Fuel quantity is depicted graphically; the color changes to yellow if the fuel quantity drops below the threshold level.



1. *Left Fuel Tank*
2. *Left Fuel Line*
3. *Fuel Pressure*
4. *Auxiliary Boost Pump*
5. *Fuel Selector*
6. *Right Fuel Tank*
7. *Right Fuel Line*
8. *Fuel Flow Data*

Figure 3-5 Fuel Synoptics Page

Status of the fuel selector is indicated between the fuel tank symbols. The mode, automatic (AUTO), manual (MAN), or off (no indication; CAS message 'FUEL OFF' generated) is shown beneath the fuel selector symbol.

Left Fuel Tank Selected	Switching Fuel Tank Selection	Right Fuel Tank Selected	Unknown Fuel Tank Selection

Table 3-2 Fuel Selector Status

If the auxiliary fuel boost pump is on, the symbol is displayed in green. The mode, automatic (AUTO) or manual (MAN) is displayed next to the pump symbol. If the boost pump is off, the symbol is shown in light blue (automatic mode) or red (manual mode).

Fuel used and remaining are based on the fuel flow. The aircraft's gross weight (GW) is entered on the AUX - Weight Planning Page (see the Flight Planning Section).

A red "X" over a component indicates invalid data or a failed unit.

3.3 GENERAL SYSTEMS

Pressing the **SYSTEM** Softkey displays the softkeys for the synoptics system. Press the **GEN** Softkey to display the General System Page.

The General Synoptics Page aircraft diagram displays open doors in red (CAS messages also generated). Statuses of propeller, stall sensor heater, pitot probe, and windshield heat are also indicated on the diagram:

- White indicates that heat is off (propeller and windshield)
- Light blue indicates heat has been selected (windshield)
- Green indicates heat is on
- Yellow indicates heat has failed (propeller, pitot tube, and stall sensor).

Invalid sensor information is indicated with a red 'X'.

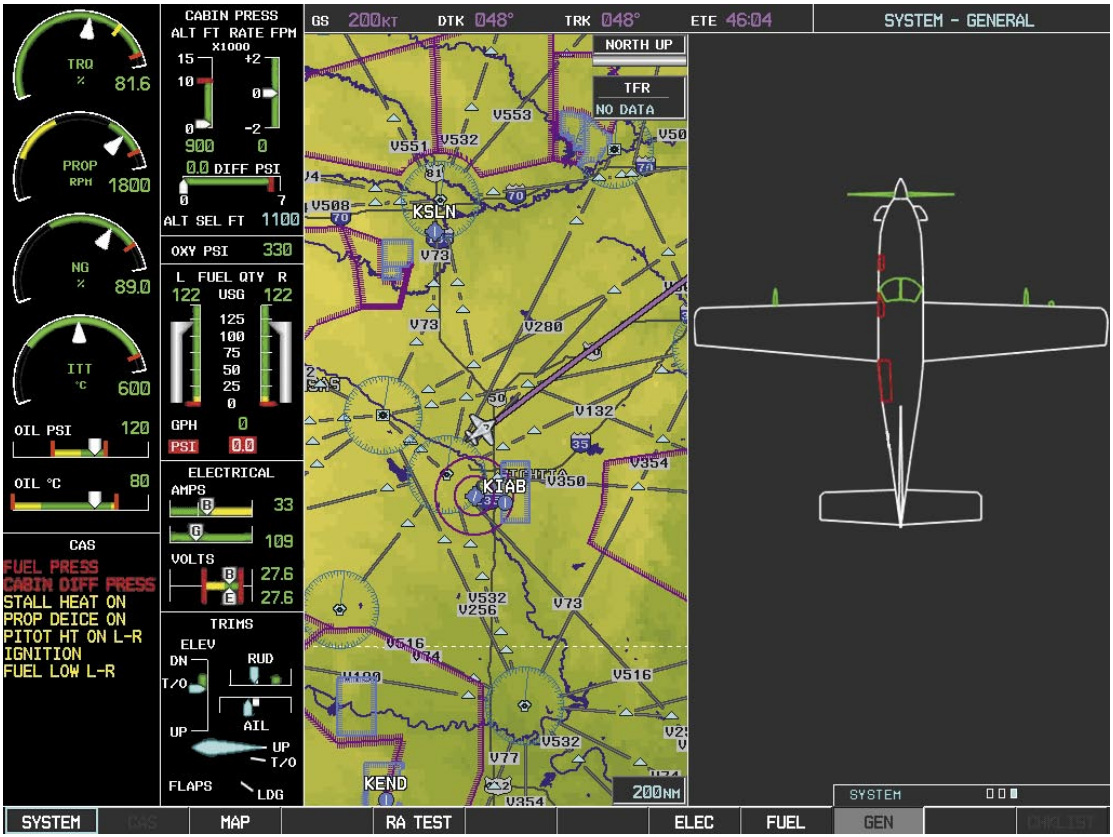


Figure 3-6 General Synoptics Page

3.4 CREW ALERTING SYSTEM (CAS)

NOTE: Refer to the Pilot's Operating Handbook (POH) for emergency procedures.

Up to 14 messages can be displayed; when more than 14 messages accumulate, the scrolling **CAS** softkeys become available.

- **Warning** (red) – Immediate crew awareness and action required; Master Warning triggered
- **Caution** (yellow) – Immediate crew awareness and possible future corrective action required; Master Caution triggered

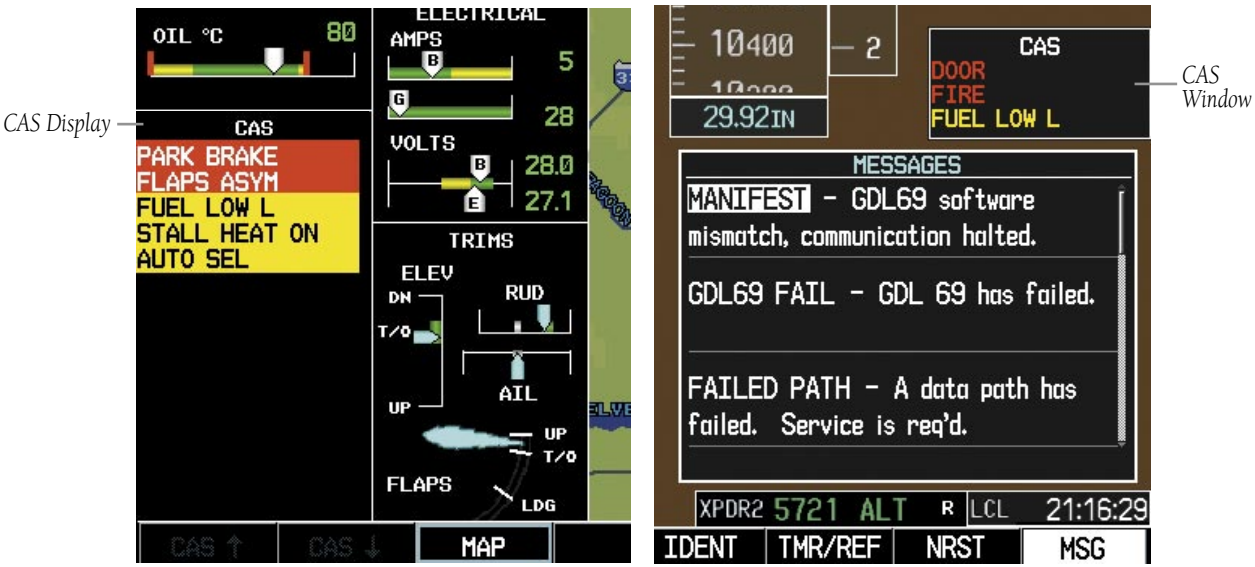


Figure 3-7 CAS Messages

Messages and Prioritization

NOTE: Red warning messages cannot be scrolled through and remain at the top of the CAS display. The scroll bar changes to yellow if more than ten caution messages exist to be scrolled through.

CAS messages are grouped by criticality (warning, caution) and sorted by order of appearance (most recent messages on top).

When a new red CAS warning message appears, it flashes (inversely red on white) in conjunction with the Master Warning Indicator. Pressing the Master Warning Indicator acknowledges all flashing red messages, extinguishing the master warning lights, and stops warning message flashing. Once acknowledged, CAS warning messages are shown in red text and are displayed until the issue is corrected.

Messages	Comments	Inhibits					
		ENGINE OFF	ENGINE ON	GROUND	TOPI	AIR	LOPI
BAT OVERHEAT	Battery temperature over 70°C						
BLEED TEMP	Bleed temperature high	X			X		
CABIN ALTITUDE	Cabin altitude over 10,000 ft			X			
CABIN DIFF PRESS	Cabin pressure differential over 6.2 psi	X					
DOOR	Pilot or cabin door open						
FIRE	Engine compartment fire (temperature over 200°C; if installed)						
FLAPS ASYM	Dissymmetry between left- and right-hand flaps						
FUEL OFF	Fuel tank selectors set to "Off"						
FUEL PRESS	Fuel pressure below 10 psi						
ITT	Engine start: ITT over 1000°C, 870°C (5 s), or 840°C (20 s) Engine running: ITT over 840°C						
OIL PRESS	Oil pressure below 60 psi						
OXYGEN	Oxygen cylinder closed						
PARK BRAKE	Parking brake applied						
TORQUE	Torque greater than or equal to 124.5% maximum torque						

Table 3-3 Warning CAS Messages

When a new yellow caution message appears on the CAS display, it flashes (inversely black on yellow). The Master Caution Indicator is also illuminated. Pressing the Master Caution Indicator acknowledges all flashing yellow messages, extinguishing the master caution lights, and stops caution message flashing. Messages are displayed until the issue is corrected.

Messages	Comments	ENGINE OFF	ENGINE ON	GROUND	TOPI	AIR	LOPI
AUTO SEL	Fuel timer off or out of service				X		
AUX BOOST PMP ON	Electric fuel pump running (manual or automatic mode)						
BAT AMP	Battery current over 50 A while on ground				X	X	X
BAT OFF	Battery off				X		
BLEED OFF	Flow control and shut-off valve/shut-off valve closed	X			X		X
CHIP	Oil chip detector on (if installed)				X		X
FRONT CARGO DOOR	Forward baggage door open				X		
FUEL IMBALANCE	Fuel tanks imbalanced by more than 15 USGAL for > 30 seconds						
FUEL LOW L-R*	Fuel quantity less than or equal to 9.1 USGAL in specified tank						
GPU DOOR	GPU receptacle door not closed				X		X
IGNITION	Ignition exciter running						
INERT SEP FAIL	Inertial separator failure	X			X		
INERT SEP ON	Inertial separator extended						
LOW LVL FAIL L-R*	Low fuel level sensor failure for specified tank						
LOW VOLTAGE	Battery voltage below 26 V				X		X
MAIN GEN	Starter generator unconnected	X			X		
OIL PRESS	Oil pressure between 60 and 100 psi	X					
OIL TEMP	Oil temperature below 0°C or above 104°C				X		
PITOT HT ON L-R*	Specified pitot heat (left or right) on while engine off		X				
PITOT NO HT L-R*	Specified pitot heat (left or right) off	X					
PROP DEICE FAIL	Prop deice selected and not on	X			X		
PROP DEICE ON	Prop deice on while engine off		X				
REAR CARGO DOOR	Rear cargo door open				X		
STALL HEAT ON	Stall warning heat on while engine off		X				
STALL NO HEAT	Stall warning heat off	X					
STARTER	Starter generator running						
VACUUM LOW	Vacuum pressure less than 3.75 in Hg	X			X		

** Only affected side (L, R, or L-R) displayed in CAS message; applicable messages listed here display L-R for example*

Table 3-4 Caution CAS Messages

Display Inhibits

Inhibits prevent certain CAS messages from being displayed during the following conditions:

- Engine off
- Engine on
- Aircraft on ground
- Takeoff
- Aircraft in air
- Landing

Takeoff and Landing Operation Phase inhibits (TOPI and LOPI) are implemented to reduce flight crew workload and distractions during takeoff and landing.

Alerts affected by an inhibit are not displayed while the inhibit is enabled. If an alert is displayed prior to the activation of an inhibit affecting it, the alert continues to be displayed normally until the condition causing the alert ceases to exist.

If a GEA or GIA fails, all CAS messages depending on sensors associated with that LRU are automatically inhibited. Inhibits cannot be activated by invalid sensor data.

SECTION 4: NAV/COM AND TRANSPONDER

The NAV/COM controls and frequency boxes share the same locations on both Primary Flight Displays.

Figure 4-1 G1000 VHF NAV/COM Controls (PFD shown)

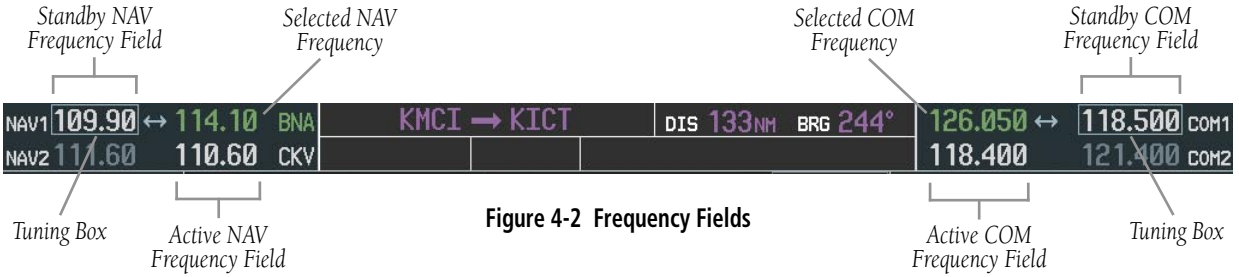


Figure 4-2 Frequency Fields

Figure 4-3 Frequency Transfer Arrow and Tuning Box

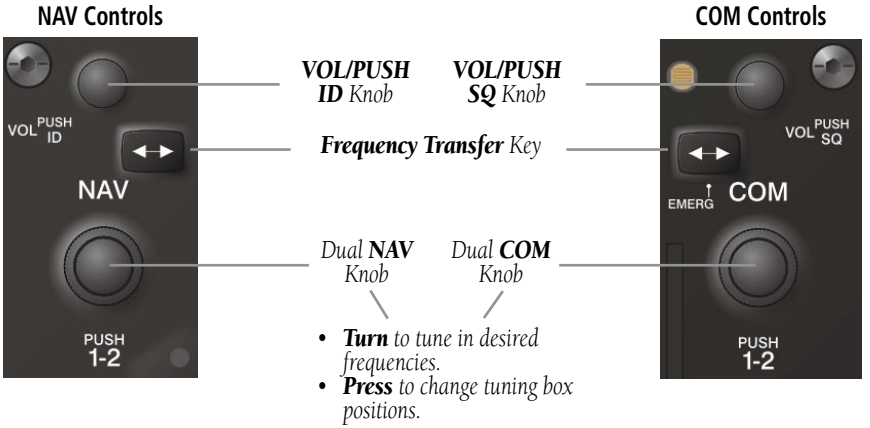


Figure 4-4 NAV/COM Controls

4.1 RADIO STATUS INDICATIONS

- RX – When a COM signal is received, a white 'RX' appears by the active COM frequency during signal reception.
- TX – When a COM radio is transmitting, a white 'TX' indication appears to the right of the corresponding COM frequency.
- ID – When the Morse code identifier is ON for a NAV radio, a white 'ID' indication appears to the left of the corresponding active NAV frequency. The Morse code identifier can be heard if the corresponding NAV radio is selected on the audio panel.

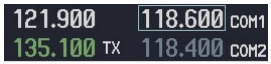


Figure 4-5 Radio Status Indications

4.2 VOLUME

'VOLUME' is displayed in place of the associated radio name (i.e., 'COM1' or 'NAV2') for two seconds after the volume level is last changed. The percentage of maximum volume is displayed in place of the standby frequency selected by the tuning box.

Figure 4-6 COM Volume Level

4.3 AUTOMATIC SQUELCH

Automatic squelch can be disabled for a COM radio by pressing the **COM** Knob to place the tuning box on the desired COM's standby frequency, then by pressing the **VOL/PUSH SQ** Knob.

4.4 QUICKLY ACTIVATING 121.500 MHZ

Pressing and holding the **COM Frequency Transfer** Key for approximately two (2) seconds automatically tunes the selected COM radio to the emergency frequency.

4.5 OPTIONAL NAV RADIOS

The ADF/DME Tuning Window is displayed by selecting the **ADF/DME** Softkey.

ADF Radio (optional)

Figure 4-7 ADF/DME Tuning Window

Tune the ADF:

1) From the tuning window, turn the large **FMS** Knob to highlight the ADF tuning field.
2) Turn the small **FMS** Knob to enter the first digit.
3) Turn the large **FMS** Knob to select the next desired digit field. Turn the small **FMS** Knob to again select the desired digit.
4) When the desired frequency is entered press the **ENT** Key to transfer the frequency into the active field.
5) Turn the large **FMS** Knob to select the MODE field. Turn the small **FMS** Knob to select ADF or BFO.
6) Turn the large **FMS** Knob to select the volume field if desired. Turn the small **FMS** Knob to adjust the ADF volume to the desired level.
7) Press the **FMS** Knob to exit all the fields.

DME Radio (optional)

The DME Tuning Window is displayed by selecting the **DME** Softkey.

Figure 4-8 ADF/DME Tuning Window

Change the DME tuning source:

1) From the tuning window, turn the large **FMS** Knob to highlight the DME source field.
2) Turn the small **FMS** Knob to display the selection window. Turn the **FMS** Knob to select the desired mode and press the **ENT** Key.

Figure 4-9 DME Selection Window

4.6 FREQUENCY AUTO-TUNING

Auto-tuning on the PFD

Figure 4-10 Nearest Airports Window (PFD)

1) Select the **NRST** Softkey to display the Nearest Airports Window.
2) Turn either **FMS** Knob to highlight the desired frequency.
3) Press the **ENT** Key to place the frequency in the standby field of the active COM.
4) Press the **Frequency Transfer** Key to place the frequency in the active field.

NAV frequencies are entered automatically in the active NAV frequency field upon approach loading or approach activation.

Auto-tuning on the MFD

Auto-tuning on the MFD is done in much the same way as on the PFD. Use the **FMS** Knobs to select the desired frequency on any of the information pages. Pressing the **ENT** Key then loads the selected frequency in the tuning box as a standby frequency.

4.7 TRANSPONDER

Selecting Transponder 1 or Transponder 2

1) Select the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
2) Select the **XPDR1** or **XPDR2** Softkey to select and activate the alternate transponder.

Mode Selection

The **STBY**, **ON**, **ALT, GND, VFR, CODE,** and **IDENT** Softkeys can be accessed by selecting the **XPDR** Softkey.

Ground Mode (Automatic or Manual)

GND is displayed when the aircraft is on the ground or when the **GND** Softkey is selected. The transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to discretely address Mode S interrogations.

Figure 4-11 Ground Mode

Standby Mode (Manual)

Select the **STBY** Softkey. In Standby Mode, the transponder does not reply to interrogations, but new codes can be entered.

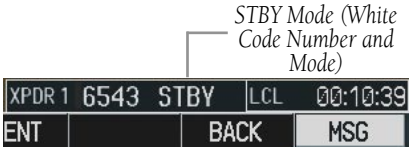


Figure 4-12 Standby Mode

Manual ON Mode

Select the **ON** Softkey. ON Mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited.

Figure 4-13 ON Mode

Altitude Mode (Automatic or Manual)

Altitude Mode is automatically selected when the aircraft becomes airborne. Altitude Mode may also be selected manually by selecting the **ALT** Softkey.

All transponder replies requesting altitude information are provided with pressure altitude information.

Figure 4-14 Altitude Mode

Reply Status

When the transponder sends replies to interrogations, an "R" indication appears momentarily in the reply status field.

Figure 4-15 Reply Indication

Code Selection

VFR Code Selection

1) Select the **XPDR** Softkey to display the transponder Mode Selection softkeys.
2) Select the **VFR** Softkey to enter the VFR code. Selecting the **VFR** Softkey again restores the previous identification code.

NOTE: *The pre-programmed VFR Code is set at the factory to 1200.*

Enter Code Using Softkeys

1) Select the **XPDR** Softkey to display the transponder Mode Selection softkeys.
2) Select the **CODE** Softkey to display the transponder Code Selection softkeys, which includes the digit softkeys.
3) Press the appropriate digit softkeys to enter the code in the four-digit code field of the Transponder Status Box. When the last digit is entered, the transponder code becomes active.

   When entering a code, select the **BKSP** Softkey as needed to back up and change code digits.

Enter Code Using the FMS Knob

1) Select the **XPDR** Softkey to display the transponder Mode Selection softkeys.
2) Select the **CODE** Softkey to display the transponder Code Selection softkeys, which includes the digit softkeys.
3) Turn the small **FMS** Knob to enter the first two digits.
4) Turn the large **FMS** Knob to place the cursor in position to change the second two digits.
5) Turn the small **FMS** Knob to enter the second two digits.
6) Press the **ENT** Key to activate the code immediately, or wait 10 seconds and the code will become active.

Flight ID Reporting

If so configured, the Flight ID may be entered in the Timer/Reference Window.

Figure 4-16 Timer/References Window

1) Select the **TMR/REF** Softkey to display the Timer/References Window.
2) Turn the large **FMS** Knob to place the cursor in the Flight ID field.
3) Turn the small **FMS** Knob to enter the desired first character.
4) Turn the large **FMS** knob to place the cursor in the next desired field.
5) Turn the small **FMS** Knob to enter the next desired character.
6) Repeat steps 4 and 5 until the desired Flight ID is entered.
7) Press the **ENT** Key. 'updating' is displayed as the Flight ID is loaded into the system.

SECTION 5: AUDIO PANEL

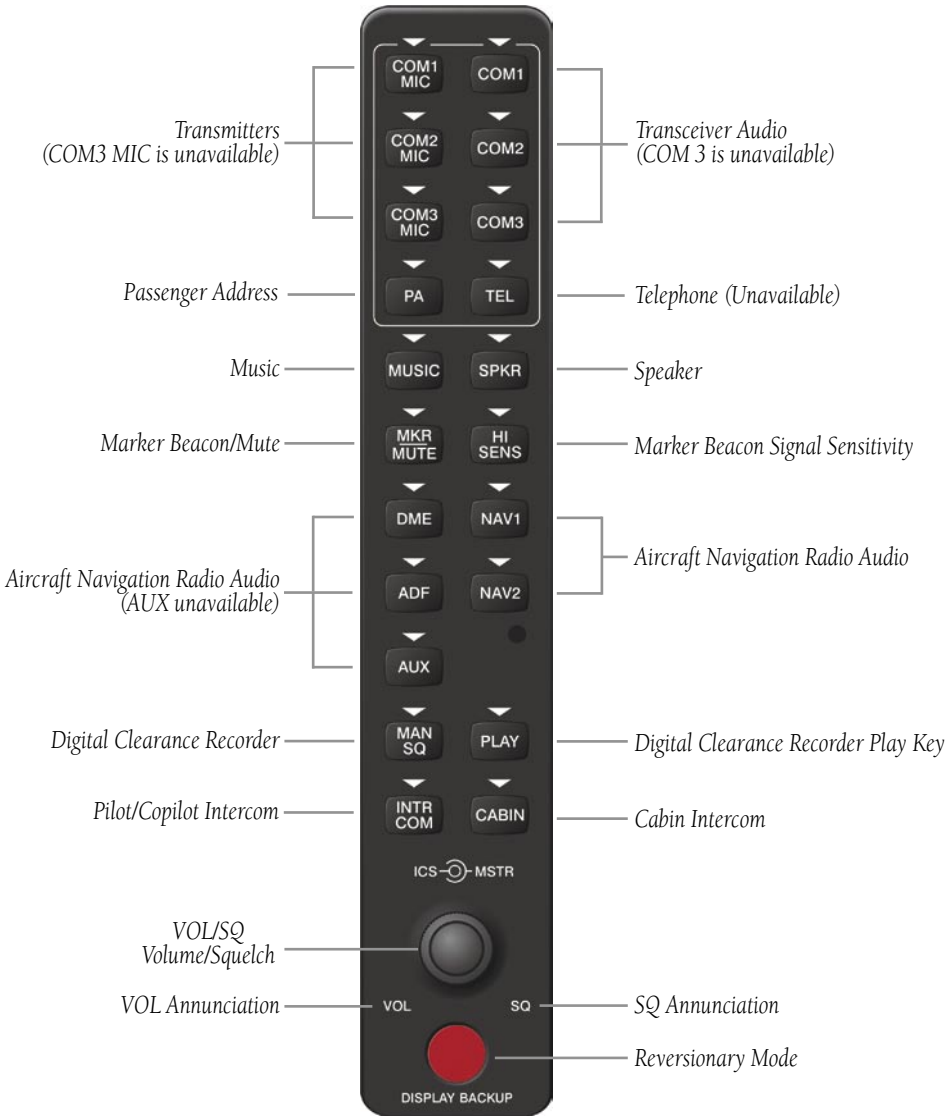


Figure 5-1 Audio Panel Controls

5.1 COM RADIO SELECTION

Pressing the **COM1 MIC** or **COM2 MIC** Key selects the active transmitter (i.e., microphone). The associated receiver audio (**COM1** or **COM2**) also becomes selected when the COM MIC Key is pressed.

Figure 5-2 Transceivers

5.2 MUSIC SELECTION

Pressing the **MUSIC** Key turns music on or off.

Figure 5-3 Music Selection

5.3 MARKER BEACON RECEIVER

The marker beacon receiver is always on. Only the marker beacon audio can be turned off. Figure 5-4 shows the marker beacon annunciators on the PFD.

When the **MKR/MUTE** Key is pressed, the key annunciator is lit and the audio tone can be heard over the speaker or headsets during marker beacon reception.

When the tone is active, pressing the **MKR/MUTE** Key once mutes the audio but does not affect the marker annunciator. The audio returns when the next marker signal is received.

To turn off the marker beacon audio, press the **MKR/MUTE** Key once when there is no marker indication present, or press twice when an indication is present. The key annunciator extinguishes when the marker beacon audio is turned off.

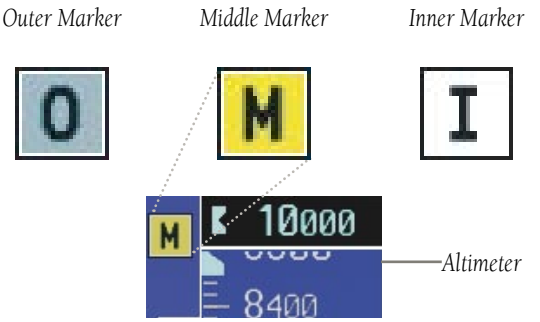


Figure 5-4 Marker Beacon Annunciators on the PFD

Marker Beacon Signal Sensitivity

The **HI SENS** Key can be pressed for increased marker beacon signal sensitivity.

Figure 5-5 Marker Beacon

5.4 NAV RADIO AUDIO SELECTION

Pressing **NAV1** or **NAV2** selects and deselects the radio source and activates the annunciator. Selected audio can be heard over the headset and the speakers. Pushing the **PUSH/VOL/ID** Knob at this time allows the navigation facility identifer to be heard. These two keys can be selected individually or together.

Figure 5-6 Navigation Radios

5.5 PASSENGER ADDRESS SYSTEM

A passenger address system is activated by pressing the **PA** Key to deliver messages to the passengers. The message is heard by the other pilot on the headset only if the **INTR COM** Key is enabled. PA messages are one way from the flight deck to the passengers.

A Push-to-talk (PTT) must be pressed to deliver PA announcements to the passengers over their headphones.

When PA is selected on the Audio Panel, the annunciator flashes about once per second while pressing the PTT, the COM MIC annunciator is no longer lit, and the active COM frequency for that Audio Panel changes to white, indicating that there is no COM selected.

Figure 5-7 PA Selection

5.6 INTERCOM

Pressing the **INTR COM** Key on either Audio Panel selects and deselects the intercom on both Audio Panels. The annunciator is lit when the intercom is active.

The **CABIN** Key enables two way communication between the flight deck and the cabin. Pressing the **CABIN** Key on either Audio Panel selects and deselects the intercom between the pilot or copilot and the passengers. The annunciator is lit when the cabin intercom is active on either audio panel.

Figure 5-8 Intcom Selection

5.7 INTERCOM SQUELCH CONTROL

Select manual squelch for intercom audio by pressing the **MAN SQ** Key to light the annunciator.

Pressing the small **VOL/SQ** Knob now switches between volume and squelch adjustment by lighting **VOL** or **SQ** respectively.

Figure 5-9 Volume/Squelch Control

5.8 DIGITAL CLEARANCE RECORDER AND PLAYER

Each reception of primary active COM audio is automatically recorded in a memory block. When the next transmission is received, it is recorded in the next memory block, and so on. Once the 2.5 minutes of recording time has been reached, the recorder begins recording over the stored memory blocks, starting from the oldest block. Powering off the unit automatically clears all recorded blocks.

Figure 5-10 Recorder/Player

- Pressing **PLAY** once plays the latest recorded memory block, then returns to normal operation.
- Pressing **MKR/MUTE** while playing a memory block stops play.
- Pressing the **PLAY** Key during play begins playing the previously recorded memory block. Each subsequent press of the **PLAY** Key begins playing the next previously recorded block.

If a COM input signal is detected while playing, play is halted and the new COM input signal is recorded as the latest block.

SECTION 6: AUTOMATIC FLIGHT CONTROL

6.1 FLIGHT DIRECTOR ACTIVATION

An initial press of a key listed in Table 6-1 (when the flight director is not active) activates the pilot-side flight director in the listed modes. The flight director may be turned off and the Command Bars removed from the displays by pressing the **FD** Key again. The **FD** Key is disabled when the autopilot is engaged.

Flight director mode annunciations are displayed on the PFDs when the flight director is active. Flight director selection and autopilot and yaw damper statuses are shown in the center of the AFCS Status Box. Lateral flight director modes are displayed on the left and vertical on the right. Armed modes are displayed in white and active in green.

Control Pressed	Modes Selected			
	Lateral		Vertical	
FD Key	Roll Hold (default)	ROL	Pitch Hold (default)	PIT
AP Key	Roll Hold (default)	ROL	Pitch Hold (default)	PIT
CWS Button	Roll Hold (default)	ROL	Pitch Hold (default)	PIT
GA Switch	Takeoff (on ground) Go Around (in air)	TO GA	Takeoff (on ground) Go Around (in air)	TO GA
ALT Key	Roll Hold (default)	ROL	Altitude Hold	ALT
VS Key	Roll Hold (default)	ROL	Vertical Speed	VS
VNV Key	Roll Hold (default)	ROL	Vertical Path Tracking*	VPTH
NAV Key	Navigation**	GPS VOR LOC	Pitch Hold (default)	PIT
BC Key	Backcourse***	BC	Pitch Hold (default)	PIT
APR Key	Approach**	GPS VOR LOC	Pitch Hold (default)	PIT
HDG Key	Heading Select	HDG	Pitch Hold (default)	PIT

Valid VNV flight plan must be entered before **VNV Key press activates flight director.*

***The selected navigation receiver must have a valid VOR or LOC signal or active GPS course before **NAV** or **APR** Key press activates flight director.*

****The selected navigation receiver must have a valid LOC signal before **BC** Key press activates flight director.*

Table 6-1 Flight Director Activation

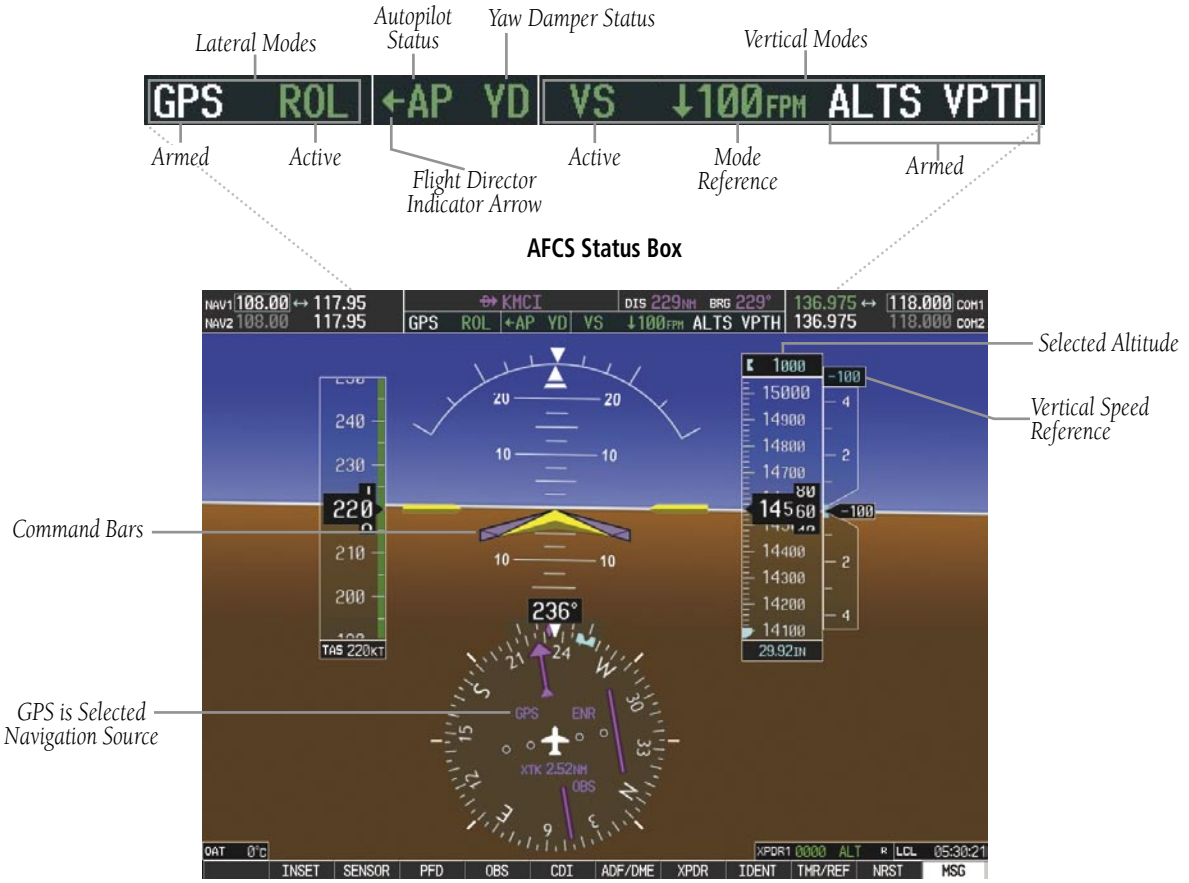


Figure 6-1 PFD AFCS Display

6.2 SWITCHING FLIGHT DIRECTORS

Only one flight director is active (selected) at a time. Flight directors may be switched by pressing the **XFR** Key on the AFCS Control Unit. Both PFDs display the selected flight director, indicated by an arrow pointing toward either the pilot or copilot side, in the center of the AFCS Status Box. The annunciator light arrow for the selected flight director is also illuminated beside the **XFR** Key. When the flight directors are switched, the vertical and lateral modes revert to default.

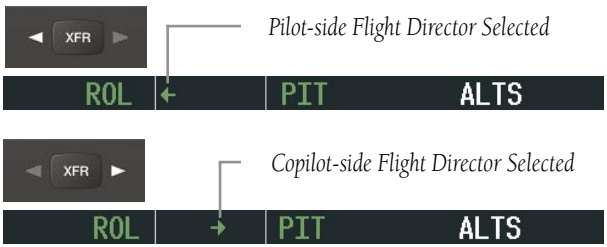


Figure 6-2 Flight Director Selection Indications

6.3 COMMAND BARS

Upon activation of the flight director, Command Bars are displayed in magenta on the PFDs as single cues or cross pointers. The Aircraft Symbol (in yellow) changes to accommodate the Command Bar format; the Command Bars do not override the Aircraft Symbol. The single-cue Command Bars (Figure 6-3) move together vertically to indicate pitch commands and bank left or right to indicate roll commands. Command Bars displayed as a cross pointer (Figure 6-4) move independently to indicate pitch (horizontal bar) and roll (vertical bar) commands. Both PFDs show the same Command Bar format. Command Bar format may only be changed while on the ground.

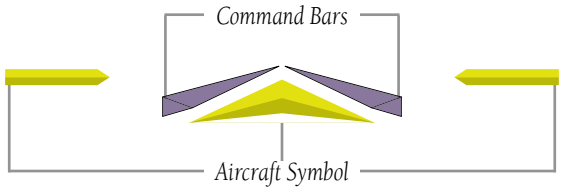


Figure 6-3 Single-cue Command Bars

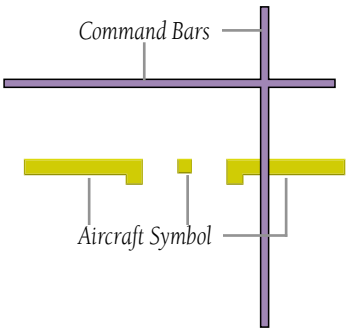


Figure 6-4 Cross-pointer Command Bars

The Command Bars are not displayed if attitude information sent to the flight director is invalid or unavailable, pitch exceeds +30°/-20°, or bank exceeds 65°.

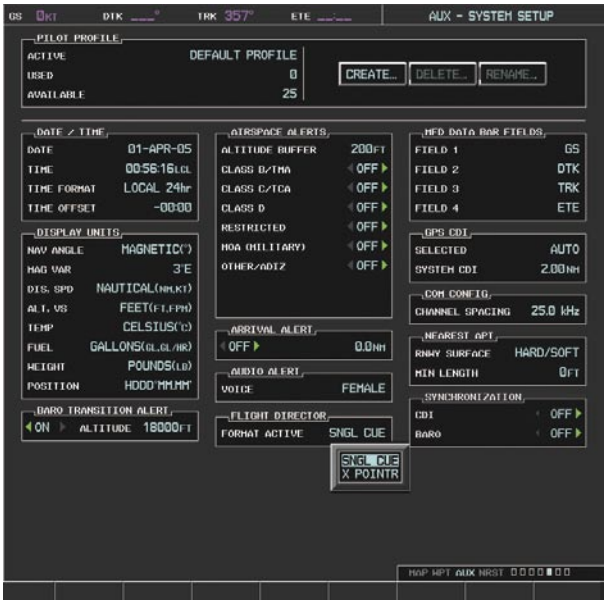


Figure 6-5 Changing Command Bar Format

Changing Command Bar Format

1) Select the AUX-SYSTEM SETUP Page as shown in Figure 6-5.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob place the flashing cursor in the FLIGHT DIRECTOR-FORMAT ACTIVE field.
4) Turn the small **FMS** Knob to display the selection window as shown in Figure 6-5.
5) Turn the small **FMS** Knob to select SNGL QUE which displays the Command Bars as a single cue.

   Or:

   Select X POINTR to display Command Bars as a cross pointer.
6) Press the **ENT** Key.

6.4 FLIGHT DIRECTOR MODES

Unless otherwise specified, all mode keys are alternate action (i.e., press on, press off). In the absence of specific mode selection, the flight director reverts to the default pitch and/or roll modes(s).

Armed modes are annunciated in white and active modes in green in the AFCS Status Box. Under normal operation, when the control for the active flight director mode is pressed, the flight director reverts to the default mode(s) for the axis(es). Automatic transition from armed to active mode is indicated by the white armed mode annunciation moving to the green active mode field and flashing for 10 seconds.

If the information required to compute a flight director mode becomes invalid or unavailable, the flight director automatically reverts to the default mode for that axis. A flashing yellow mode annunciation and annunciator light indicate loss of sensor (AHRS, ADC, IAU) or navigation data (VOR, LOC, GPS, VNV, WAAS) required to compute commands. When such a loss occurs, the system automatically begins to roll the wings level (enters Roll Hold Mode) or maintain the pitch angle (enters Pitch Hold Mode), depending on the affected axis. The flashing annunciation stops when the affected mode key is pressed or another mode for the axis is selected. If after 10 seconds no action is taken, the flashing annunciation stops.

Figure 6-6 Loss of VOR Signal

The flight director is automatically disabled if the attitude information required to compute the default flight director modes is invalid or unavailable.

Vertical Modes

The GFC 700 AFCS offers the following vertical modes. Corresponding controls and annunciations are given in Table 6-1.

- **Pitch Hold** (default mode)— Holds the current aircraft pitch attitude; may be used to climb/descend to the Selected Altitude
- **Selected Altitude Capture** — Captures the Selected Altitude
- **Altitude Hold** — Holds the current Altitude Reference
- **Vertical Speed** — Maintains the current aircraft vertical speed; may be used to climb/descend to the Selected Altitude
- **Flight Level Change** — Maintains the current aircraft airspeed while the aircraft is climbing/descending to the Selected Altitude
- **Vertical Path Tracking** — Follows an active vertical profile for enroute and terminal phases of flight
- **VNAV Target Altitude Capture** — Captures the VNAV Target Altitude
- **Glidepath** — Intercepts and tracks the WAAS glidepath on approach (only available in installations with GIA 63W Integrated Avionics Units and when WAAS is available)
- **Glideslope** — Intercepts and tracks the ILS glideslope on approach
- **Takeoff (in air)** — Automatically disengages the autopilot and commands a constant pitch angle and wings level on the ground in preparation for takeoff
- **Go Around** — Automatically disengages the autopilot and commands a constant pitch angle and wings level while in the air

Vertical Mode	Description	Control	Annunciation
Pitch Hold	Holds the current aircraft pitch attitude; may be used to climb/descend to the Selected Altitude	(default)	PIT
Selected Altitude Capture	Captures the Selected Altitude	*	ALTS
Altitude Hold	Holds the current Altitude Reference	**ALT** Key	ALT nnnnn FT
Vertical Speed	Maintains the current aircraft vertical speed; may be used to climb/descend to the Selected Altitude	**VS** Key	VS nnnn FPM
Flight Level Change, IAS Hold	Maintains the current aircraft airspeed (in IAS or Mach) while the aircraft is climbing/descending to the Selected Altitude	**FLC** Key	FLC nnn KT
Flight Level Change, Mach Hold			FLC M .nnn
Vertical Path Tracking	Captures and tracks descent legs of an active vertical profile	**VNV** Key	VPTH
VNV Target Altitude Capture	Captures the Vertical Navigation (VNV) Target Altitude	**	ALTV
Glidepath	Captures and tracks the WAAS glidepath on approach	**APR** Key	GP
Glideslope	Captures and tracks the ILS glideslope on approach		GS
Takeoff (on ground)	Disengages the autopilot and commands a constant pitch angle and wings level in the air on the ground in preparation for takeoff	**GA** Switch	TO
Go Around (in air)	Disengages the autopilot and commands a constant pitch angle and wings level in the air		GA

* *ALTS armed automatically when PIT, VS, FLC, TO, or GA active, and under VPTH when Selected Altitude is to be captured instead of VNV Target Altitude*

** *ALTV armed automatically under VPTH when VNV Target Altitude is to be captured instead of Selected Altitude*

Table 6-2 Flight Director Vertical Modes

Pitch Hold Mode (PIT)

When the flight director is activated (the **FD** Key is pressed) or switched, Pitch Hold Mode is selected by default. Pitch Hold Mode is indicated as the active vertical mode by the 'PIT' annunciation. This mode may be used for climb or descent to the Selected Altitude (shown above the Altimeter), since Selected Altitude Capture Mode is automatically armed when the mode is activated.

In Pitch Hold Mode, the flight director maintains a constant pitch attitude, the pitch reference. The pitch reference is set to the aircraft pitch attitude at the moment of mode selection. If the aircraft pitch attitude exceeds the flight director pitch command limitations, the flight director commands a pitch angle equal to the nose-up/down limit.

Changing the Pitch Reference

When operating in Pitch Hold Mode, the pitch reference can be adjusted by:

- Using the **NOSE UP/DN** Wheel
- Pressing the **CWS** Button, hand-flying the aircraft to establish a new pitch reference, then releasing the **CWS** Button

Selected Altitude Capture Mode (ALTS)

Selected Altitude Capture Mode is automatically armed with activation of the following modes:

- Pitch Hold
- Vertical Speed
- Flight Level Change
- Go Around
- Vertical Path Tracking (if the Selected Altitude is to be captured instead of the VNV Target Altitude)

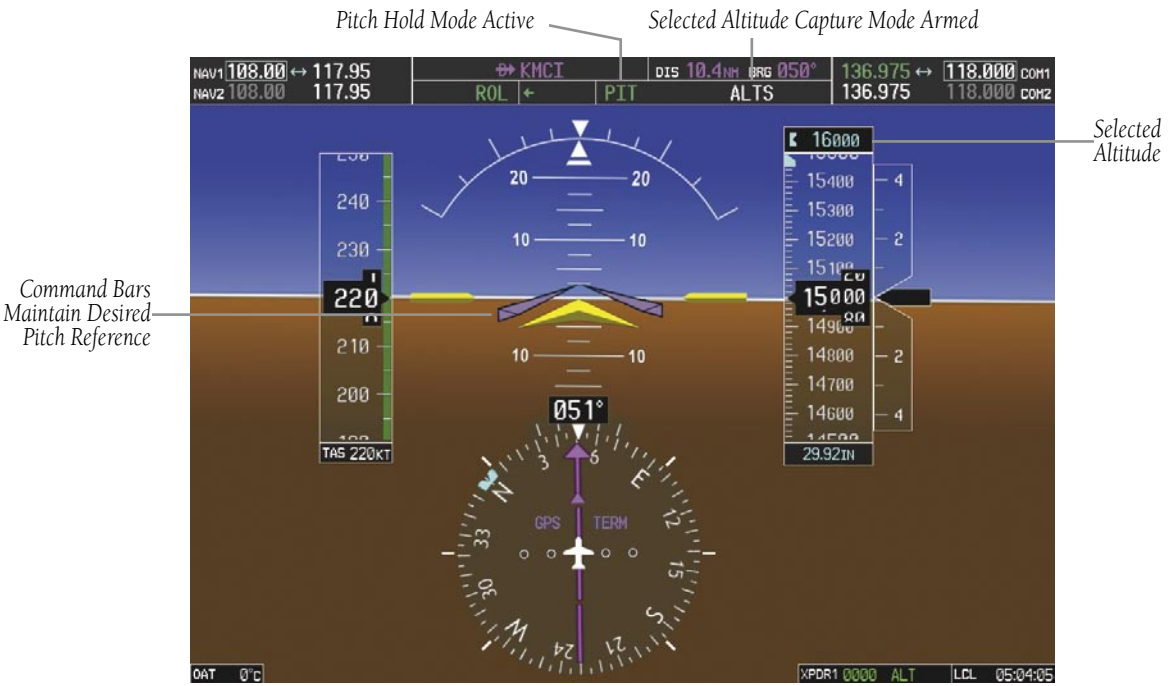


Figure 6-7 Pitch Hold Mode

The white 'ALTS' annunciation indicates Selected Altitude Capture Mode is armed (see Figure 6-7). The **ALT SEL** Knob is used to set the Selected Altitude (shown above the Altimeter) until Selected Altitude Capture Mode becomes active.

As the aircraft nears the Selected Altitude, the flight director automatically transitions to Selected Altitude Capture Mode with Altitude Hold Mode armed (Figure 6-8). This automatic transition is indicated by the green 'ALTS' annunciation flashing for up to 10 seconds and the appearance of the white 'ALT' annunciation. The Selected Altitude is shown as the Altitude Reference beside the 'ALTS' annunciation.

At 50 feet from the Selected Altitude, the flight director automatically transitions from Selected Altitude Capture to Altitude Hold Mode and holds the Selected Altitude (shown as the Altitude Reference). As Altitude Hold Mode becomes active, the white 'ALT' annunciation moves to the active vertical mode field and flashes green for 10 seconds to indicate the automatic transition.

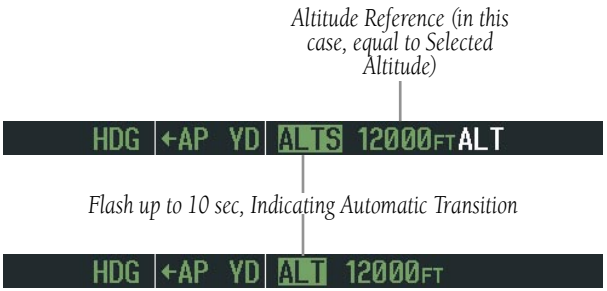


Figure 6-8 Automatic Mode Transitions During Altitude Capture

Changing the Selected Altitude

***NOTE:** Pressing the **CWS** Button while in Selected Altitude Capture Mode does not cancel the mode.*

Use of the **ALT SEL** Knob to change the Selected Altitude while Selected Altitude Capture Mode is active causes the flight director to revert to Pitch Hold Mode with Selected Altitude Capture Mode armed for the new Selected Altitude.

Altitude Hold Mode (ALT)

Altitude Hold Mode can be activated by pressing the **ALT** Key; the flight director maintains the current aircraft altitude (to the nearest 10 feet) as the Altitude Reference. The flight director's Altitude Reference, shown in the AFCS Status Box, is independent of the Selected Altitude, displayed above the Altimeter. Altitude Hold Mode active is indicated by a green 'ALT' annunciation in the AFCS Status Box.

Altitude Hold Mode is automatically armed when the flight director is in Selected Altitude Capture Mode (see Figure 6-7). Selected Altitude Capture Mode automatically transitions to Altitude Hold Mode when the altitude error is less than 50 feet. In this case, the Selected Altitude becomes the flight director's Altitude Reference.

Changing the Altitude Reference

***NOTE:** Turning the **ALT SEL** Knob while in Altitude Hold Mode changes the Selected Altitude, but not the flight director's Altitude Reference, and does not cancel the mode.*

With the **CWS** Button depressed, the aircraft can be hand-flown to a new Altitude Reference. When the **CWS** Button is released at the desired altitude, the new altitude is established as the Altitude Reference.

If the Selected Altitude is reached during CWS maneuvering, the Altitude Reference is not changed. To adjust the Altitude Reference in this case, the **CWS** Button must be pressed again after the Selected Altitude is reached.

Vertical Speed Mode (VS)

In Vertical Speed Mode, the flight director acquires and maintains a Vertical Speed Reference. Current aircraft vertical speed (to the nearest 100 fpm) becomes the Vertical Speed Reference at the moment of Vertical Speed Mode activation. This mode may be used for climb or descent to the Selected Altitude (shown above the Altimeter) since Selected Altitude Capture Mode is automatically armed when Vertical Speed Mode is selected.

When Vertical Speed Mode is activated by pressing the **VS** Key, 'VS' is annunciated in green in the AFCS Status Box along with the Vertical Speed Reference. The Vertical Speed Reference is also displayed above the Vertical Speed Indicator. A Vertical Speed Reference Bug corresponding to the Vertical Speed Reference is shown on the indicator.

Changing the Vertical Speed Reference

The Vertical Speed Reference (shown both in the AFCS Status Box and above the Vertical Speed Indicator) may be changed by:

- Using the **NOSE UP/DN** Wheel
- Pressing the **CWS** Button, hand-flying the aircraft to attain a new Vertical Speed Reference, then releasing the **CWS** Button

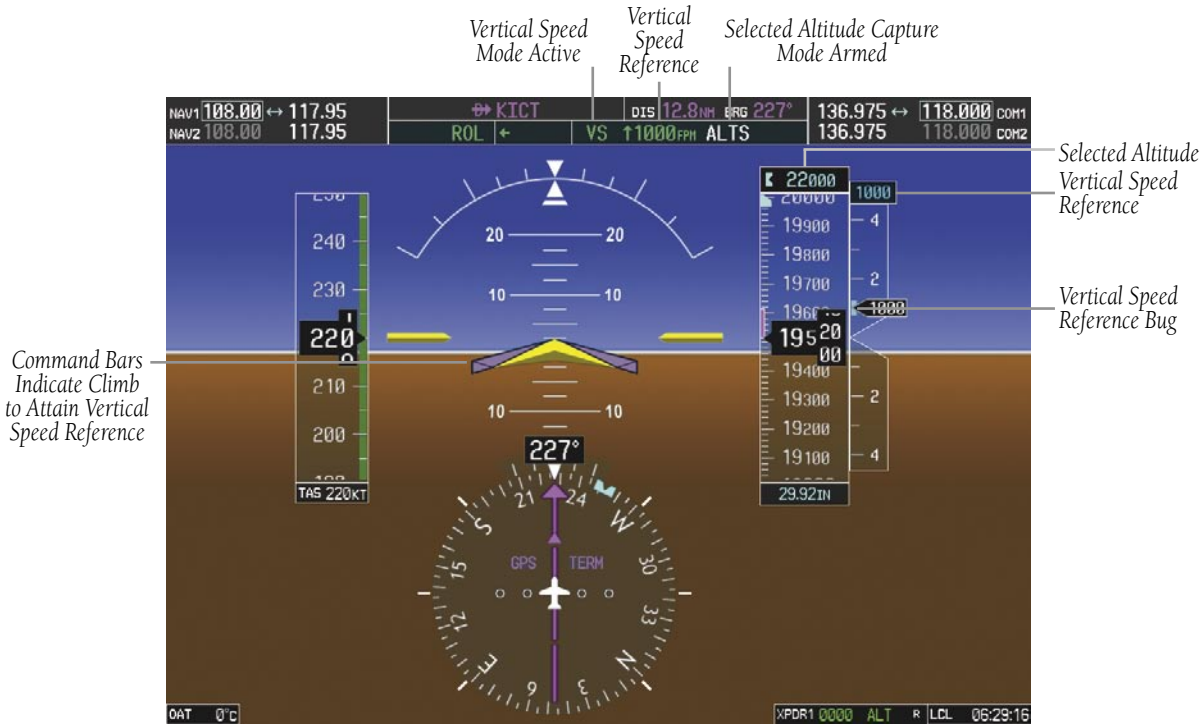


Figure 6-9 Vertical Speed Hold Mode

Flight Level Change Mode (FLC)

***NOTE:** The Selected Altitude should be set before selecting Flight Level Change Mode.*

Flight Level Change Mode is selected by pressing the **FLC** Key. This mode acquires and maintains the Airspeed Reference while climbing or descending to the Selected Altitude (shown above the Altimeter). When Flight Level Change Mode is active, the flight director continuously monitors Selected Altitude, airspeed, Mach, and altitude.

The Airspeed Reference is set to the current airspeed upon mode activation. Flight Level Change Mode is indicated by a green 'FLC' annunciation beside the Airspeed Reference in the AFCS Status Box. The Airspeed Reference is also displayed directly above the Airspeed Indicator, along with a bug corresponding to the Airspeed Reference along the tape.

Engine power must be adjusted to allow the autopilot to fly the aircraft at a pitch attitude corresponding to the desired flight profile (climb or descent) while maintaining the Airspeed Reference. The flight director maintains the current altitude until either engine power or the Airspeed Reference are adjusted and does not allow the aircraft to climb or descend away from the Selected Altitude.

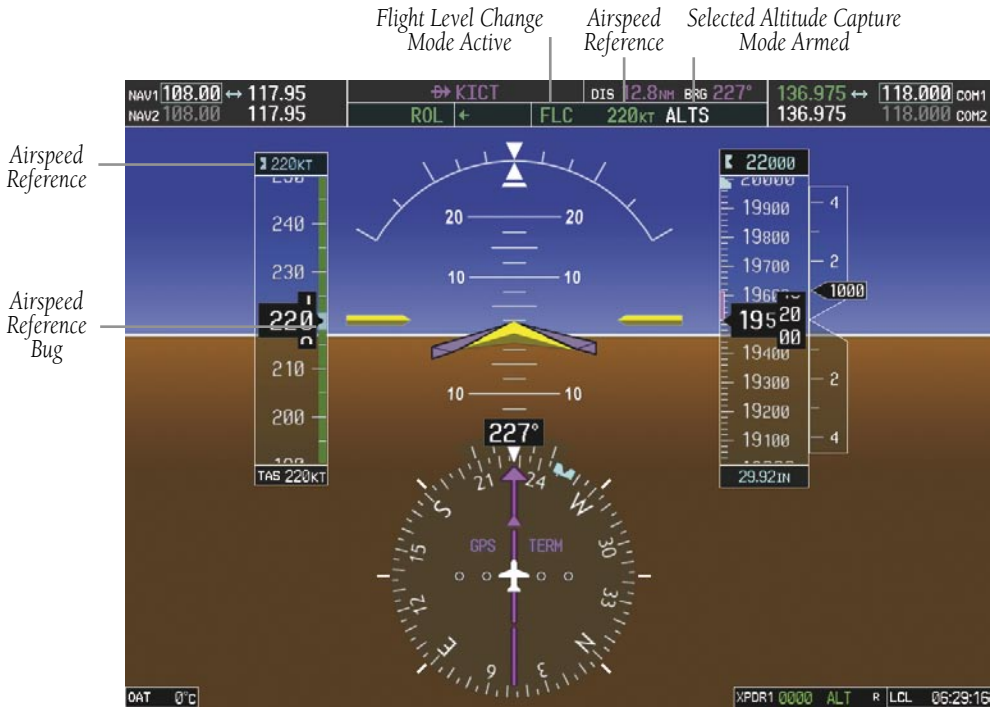


Figure 6-10 Flight Level Change Mode (IAS)

Changing the Airspeed Reference

The Airspeed Reference (shown in both the AFCS Status Box and above the Airspeed Indicator) may be adjusted by:

- Using the **NOSE UP/DN** Wheel
- Pressing the **CWS** Button, hand-flying the aircraft to attain a new Airspeed Reference, then releasing the **CWS** Button

Vertical Navigation Modes (VPTH, ALTV)

NOTE: *VNV is disabled when parallel track or Dead Reckoning Mode is active. Refer to the Navigation section for more information on VNV flight plans.*

NOTE: *The Selected Altitude takes precedence over any other vertical constraints.*

Vertical Navigation (VNV) flight control is available for enroute/terminal cruise and descent operations when VNV flight planning is available. Conditions for availability include, but are not limited to:

- The selected navigation source is GPS.
- A VNV flight plan (with at least one altitude-constrained waypoint) or vertical direct-to is active.
- VNV is enabled (**VNV ENBL** Softkey pressed on the MFD).
- Crosstrack error is valid and within certain limits.
- Desired/actual track are valid or track angle error is within certain limits.
- The VNV Target Altitude of the active waypoint is no more than 250 ft above the current aircraft altitude.

The flight director may be armed for VNV at any time, but no target altitudes are captured during a climb. The Command Bars provide vertical profile guidance based on specified altitudes (entered manually or loaded from the database) at waypoints in the active flight plan or vertical direct-to. The appropriate VNV flight control modes are sequenced by the flight director to follow the path defined by the vertical profile. Upon reaching the last waypoint in the VNV flight plan, the flight director transitions to Altitude Hold Mode and cancels any armed VNV modes.

Vertical Path Tracking Mode (VPTH)

NOTE: *If another vertical mode key is pressed while Vertical Path Tracking Mode is selected, Vertical Path Tracking Mode reverts to armed.*

NOTE: *Pressing the **CWS** Button while Vertical Path Tracking Mode is active does not cancel the mode. The autopilot guides the aircraft back to the descent path upon release of the **CWS** Button.*

When a vertical profile (VNV flight plan) is active and the **VNV** Key is pressed, Vertical Path Tracking Mode is armed in preparation for descent path capture. 'VPTH' (or '/V' when Glidepath or Glideslope Mode is concurrently armed) is annunciated in white in addition to previously armed modes. If applicable, the appropriate altitude capture mode is armed for capture of the next VNV Target Altitude (ALTV) or the Selected Altitude (ALTS), whichever is greater.

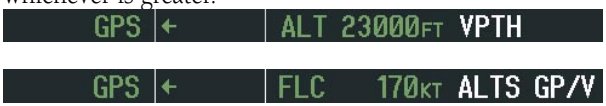


Figure 6-11 Vertical Path Tracking Armed Annunciations

Prior to descent path interception, the Selected Altitude must be set below the current aircraft altitude by at least 75 feet. For the flight director to transition from Altitude Hold to Vertical Path Tracking Mode, acknowledgment is required within five minutes of descent path interception by:

- Pressing the **VNV** Key
- Adjusting the Selected Altitude

If acknowledgment is not received within 1 minute of descent path interception, the white 'VPTH' annunciation and the **VNV** Key annunciator light start to flash. Flashing continues until acknowledged or the descent path is intercepted. If the descent is not confirmed by the time of interception, Vertical Path Tracking Mode remains armed and the descent is not captured.

In conjunction with the "TOD [top of descent] within 1 minute" annunciation in the PFD Navigation Status Box and the "Vertical track" voice message, VNV indications (VNV Target Altitude, vertical deviation, and vertical speed required) appear on the PFDs in magenta (Figure 6-12). When a descent leg is captured (i.e., vertical deviation becomes valid), Vertical Path Tracking becomes active and tracks the descent profile (Figure 6-13). An altitude capture mode ('ALTS' or 'ALTV') is armed as appropriate.

If the Altimeter's barometric setting is adjusted while Vertical Path Tracking is active, the flight director increases/decreases the descent rate by up to 500 fpm to re-establish the aircraft on the descent path (without commanding a climb). Adjusting the altimeter barometric setting creates discontinuities in VNV vertical deviation, moving the descent path.

For large adjustments, it may take several minutes for the aircraft to re-establish on the descent path. If the change is made while nearing a waypoint with a VNV Target Altitude, the aircraft may not re-establish on the descent path in time to meet the vertical constraint.

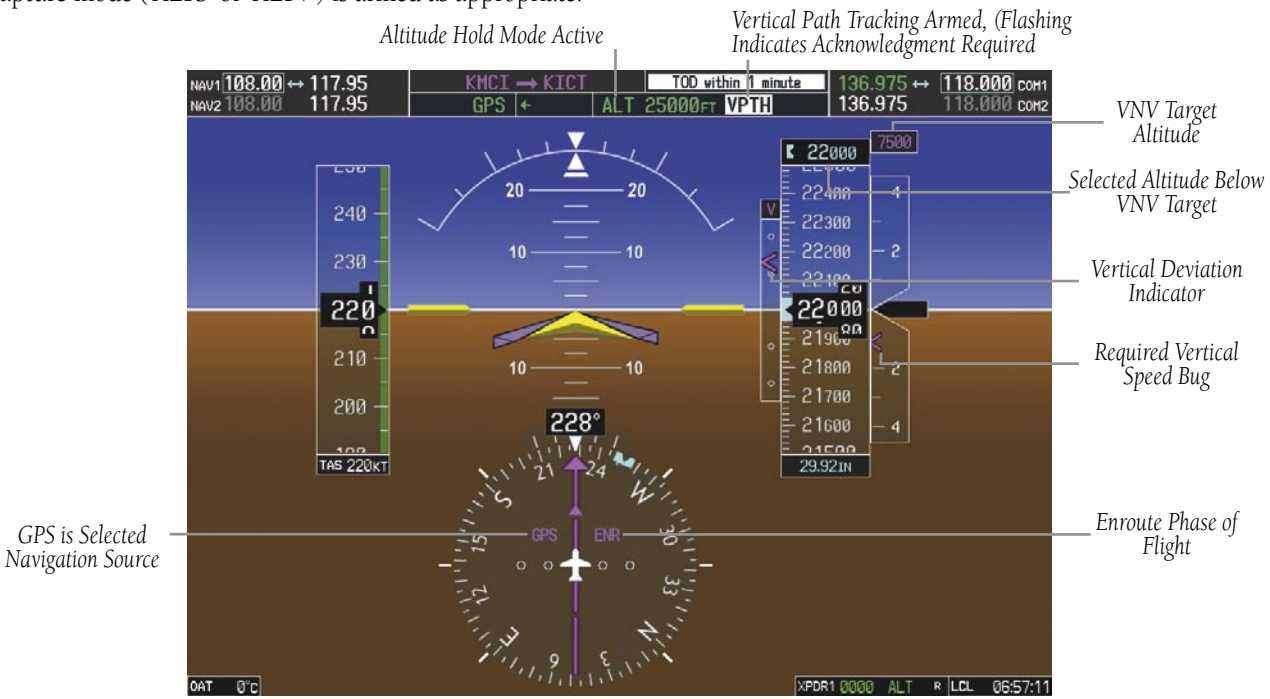


Figure 6-12 Vertical Path Capture

Figure 6-13 Vertical Path Tracking Mode

Automatic Reversion to Pitch Hold Mode

Several situations can occur while Vertical Path Tracking Mode is active which cause the flight director to revert to Pitch Hold Mode:

- Vertical deviation exceeds 200 feet during an overspeed condition.
- Vertical deviation experiences a discontinuity that both exceeds 200 feet in magnitude and results in the vertical deviation exceeding 200 feet in magnitude. Such discontinuities are usually caused by flight plan changes that affect the vertical profile.
- Vertical deviation becomes invalid (the Vertical Deviation Indicator is removed from the PFD).
- A display enters Reversionary Mode (this does not apply to an active vertical direct-to).

Unless VNV is disabled, Vertical Path Tracking Mode and the appropriate altitude capture mode become armed following the reversion to Pitch Hold Mode to allow for possible profile recapture.

Non-Path Descents

Pitch Hold, Vertical Speed, and Flight Level Change modes can also be used to fly non-path descents while VNV flight control is selected. If the **VS** or **FLC** Key is pressed while Vertical Path Tracking Mode is selected, Vertical Path Tracking Mode reverts to armed along with the appropriate altitude capture mode to allow profile recapture.

Figure 6-14 Flight Level Change VNV Non-Path Descent

To prevent immediate profile re-capture, the following must be satisfied:

- At least 10 seconds have passed since the non-path transition was initiated
- Vertical deviation from the profile has exceeded 250 feet, but is now less than 200 feet

Pressing the **VNV** Key twice re-arms Vertical Path Tracking for immediate profile re-capture.

VNV Target Altitude Capture Mode (ALTV)

***NOTE:** Armed VNV Target Altitude and Selected Altitude capture modes are mutually exclusive. However, Selected Altitude Capture Mode is armed implicitly (not annunciated) whenever VNV Target Altitude Capture Mode is armed.*

VNV Target Altitude Capture is analogous to Selected Altitude Capture Mode and is armed automatically after the **VNV** Key is pressed and the next VNV Target Altitude is to be intercepted before the Selected Altitude. The annunciation 'ALTV' indicates that the VNV Target Altitude is to be captured. VNV Target Altitudes are shown in the active flight plan or vertical direct-to, and can be entered manually or loaded from a database (see the Navigation section for details). At the same time as "TOD within 1 minute" is annunciated in the Navigation Status Box, the active VNV Target Altitude is displayed above the Vertical Speed Indicator (see Figure 6-13) and the "Vertical Track" aural annunciation is issued.

As the aircraft nears the VNV Target Altitude, the flight director automatically transitions to VNV Target Altitude Capture Mode with Altitude Hold Mode armed. This automatic transition is indicated by the green 'ALTV' annunciation flashing for up to 10 seconds and the appearance of the white 'ALT" annunciation. The VNV Target Altitude is shown as the Altitude Reference beside the 'ALTV' annunciation and remains displayed above the Vertical Speed Indicator. The Required Vertical Speed Indication (RSVI) is removed once VNV Target Altitude Capture Mode becomes active.

At 50 feet from the VNV Target Altitude, the flight director automatically transitions from VNV Target Altitude Capture to Altitude Hold Mode and tracks the level leg. As Altitude Hold Mode becomes active, the white 'ALT' annunciation moves to the active vertical mode field and flashes green for 10 seconds to indicate the automatic transition. The flight director automatically arms Vertical Path Tracking, allowing upcoming descent legs to be captured and subsequently tracked.

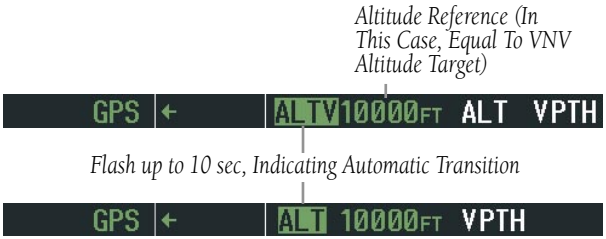

Altitude Reference (In This Case, Equal To VNV Altitude Target)
GPS
ALTV10000FT ALT VPTH
Flash up to 10 sec, Indicating Automatic Transition
GPS
ALT 10000FT VPTH

Figure 6-15 VNV Altitude Capture

Changing the VNV Target Altitude

***NOTE:** Pressing the **CWS** Button while in VNV Target Altitude Capture Mode does not cancel the mode.*

Changing the current VNV Target Altitude while VNV Target Altitude Capture Mode is active causes the flight director to revert to Pitch Hold Mode. Vertical Path Tracking and the appropriate altitude capture mode are armed in preparation to capture the new VNV Target Altitude or the Selected Altitude, depending on which altitude is to be intercepted first.

VNV target altitudes can be changed while editing the active flight plan (see the Navigation section for details).

Glidepath Mode (GP)

NOTE: *Pressing the **CWS** Button while Glidepath Mode is active does not cancel the mode. The autopilot guides the aircraft back to the glidepath upon release of the **CWS** Button.*

Glidepath Mode is used to track the WAAS-based glidepath. When Glidepath Mode is armed, 'GP' is annunciated in white in the AFCS Status Box.

Selecting Glidepath Mode

1) Ensure a GPS approach is loaded into the active flight plan. The active waypoint must be part of the flight plan (cannot be a direct-to a waypoint not in the flight plan).

2) Ensure that GPS is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).

3) Press the **APR** Key.

Upon reaching the glidepath, the flight director transitions to Glidepath Mode and begins to capture and track the glidepath.

Figure 6-17 Glidepath Mode Armed

Once the following conditions have been met, the glidepath can be captured:

- The active waypoint is at or after the final approach fix (FAF).
- Vertical deviation is valid.
- The CDI is at less than full scale deviation
- Automatic sequencing of waypoints has not been suspended (no 'SUSP' annunciation on the HSI)

Figure 6-16 Glidepath Mode

Glideslope Mode (GS)

NOTE: *Pressing the* ***CWS*** *Button while Glideslope Mode is active does not cancel the mode. The autopilot guides the aircraft back to the glideslope upon release of the* ***CWS*** *Button.*

Glideslope Mode is available for LOC/ILS approaches to capture and track the glideslope. When Glideslope Mode is armed (annunciated as 'GS' in white), LOC Approach Mode is armed as the lateral flight director mode.

Selecting Glideslope Mode

1) Ensure a valid localizer frequency is tuned.
2) Ensure that LOC is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
3) Press the **APR** Key.

Or:

1) Ensure that GPS is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
2) Ensure a LOC/ILS approach is loaded into the active flight plan.
3) Ensure the corresponding LOC frequency is tuned.
4) Press the **APR** Key.

Figure 6-19 Glideslope Mode Armed

Once LOC is the navigation source, the localizer and glideslope can be captured. Upon reaching the glideslope, the flight director transitions to Glideslope Mode and begins to capture and track the glideslope.

Figure 6-18 Glideslope Mode

Takeoff (TO) and Go Around (GA) Modes

Go Around and Takeoff modes are coupled pitch and roll modes and are annunciated as both the vertical and lateral modes when active. In these modes, the flight director commands a constant set pitch attitude and keeps the wings level. The **GA** Switch is used to select both modes. The mode entered by the flight director depends on whether the aircraft is on the ground.

Takeoff Mode provides an attitude reference during rotation and takeoff. This mode can be selected only while on the ground by pushing the **GA** Switch. The flight director Command Bars assume a wings-level, 7.5° pitch-up attitude.

Pressing the **GA** Switch while in the air activates the flight director in a wings-level, 7.5° pitch-up attitude, allowing the execution of a missed approach or a go around. Go Around Mode disengages the autopilot and arms Selected Altitude Capture Mode automatically. Subsequent autopilot engagement is allowed. Attempts to modify the aircraft attitude (i.e., with the **NOSE UP/DN** Wheel or **CWS** Button) result in reversion to Pitch and Roll Hold modes.

Lateral Modes

The GFC 700 in the Socata TBM 850 offers the following lateral modes:

- **Roll Hold** (default mode) — Holds the current aircraft roll attitude or rolls the wings level, depending on the commanded bank angle

Figure 6-20 Go Around Mode

- **Low Bank** — Limits the maximum commanded roll angle
- **Heading Select** — Captures and tracks the Selected Heading
- **Navigation** — Captures and tracks the selected navigation source (GPS, VOR, LOC)
- **Backcourse** — Captures and tracks a localizer signal for backcourse approaches
- **Approach** — Captures and tracks the selected navigation source (GPS, VOR, LOC)
- **Takeoff** — Commands a constant pitch angle and wings level on the ground in preparation for takeoff
- **Go Around** — Commands a constant pitch angle and wings level while in the air

Table 6-3 relates each lateral mode to its respective control and annunciation.

The **CWS** Button does not change lateral references for Heading Select, Navigation, Backcourse, or Approach modes. The autopilot guides the aircraft back to the Selected Heading/Course upon release of the **CWS** Button.

Lateral Mode	Description	Control	Annunciation
Roll Hold	Holds current aircraft roll attitude or rolls wings level, depending on commanded bank angle	(default)	ROL
Low Bank	Limits maximum commanded roll angle	**BANK** Key	*
Heading Select	Captures and tracks Selected Heading	**HDG** Key	HDG
Navigation, GPS	Captures and tracks selected navigation source (GPS, VOR, LOC)	**NAV** Key	GPS
Navigation, VOR Enroute			VOR
Navigation, LOC (No Glideslope)			LOC
Backcourse	Captures and tracks a localizer signal for backcourse approaches	**BC** Key	BC
Approach, GPS	Captures and tracks selected navigation source (GPS, VOR, LOC)	**APR** Key	GPS
Approach, VOR			VAPP
Approach, LOC (Glideslope Mode automatically armed)			LOC
Takeoff (on ground)	Disengages autopilot and commands a constant pitch angle and wings level in preparation for takeoff	**GA** Switch	TO
Go Around (in air)	Disengages autopilot and commands a constant pitch angle and wings level in the air		GA

** No annunciation appears in the AFCS Status Box. The acceptable bank angle range is indicated in green along the Roll Scale of the Attitude Indicator.*

Table 6-3 Flight Director Lateral Modes

Roll Hold Mode (ROL)

NOTE: If Roll Hold Mode is activated as a result of a mode reversion, the flight director rolls the wings level.

When the flight director is activated or switched, Roll Hold Mode is selected by default. This mode is annunciated as 'ROL' in the AFCS Status Box as shown in Figure 6-21. The current aircraft bank angle is held, subject to the bank angle conditions in Table 6-4.

Figure 6-21 Roll Hold Mode Annunciation

Bank Angle	Flight Director Response
< 6°	Rolls wings level
6 to 30°	Maintains current aircraft roll attitude
> 30°	Limits bank to 30°

Table 6-4 Roll Hold Mode Responses

Changing the Roll Reference

The roll reference can be changed by pressing the **CWS** Button, establishing the desired bank angle, then releasing the **CWS** Button.

Low Bank Mode

When in Low Bank Mode, the flight director limits the maximum commanded roll angle to 15°. Low bank arc limits are displayed in green along the Roll Scale as seen in Figure 6-22.

Low Bank Mode can be manually selected/deselected by pressing the **BANK** Key while in Heading Select or Navigation Modes (GPS and VOR). Low Bank Mode is activated automatically above 25,000 feet. The flight director deactivates Low Bank Mode when descending through 25,000 feet. The annunciator light next to the **BANK** Key illuminates while Low Bank Mode is selected.

Figure 6-22 Low Bank Mode Limits

Heading Select Mode (HDG)

Heading Select Mode is activated by pressing the **HDG** Key. Heading Select Mode acquires and maintains the Selected Heading. The Selected Heading is shown by a light blue bug on the HSI and in the box to the upper left of the HSI.

Changing the Selected Heading

***NOTE:** Pressing the **HDG** Knob synchronizes the Selected Heading to the current heading.*

The Selected Heading is adjusted using the **HDG** Knob on either PFD. Pressing the **CWS** Button and hand-flying the aircraft does not change the Selected Heading. The autopilot guides the aircraft back to the Selected Heading upon release of the **CWS** Button.

Turns are commanded in the same direction as Selected Heading Bug movement, even if the bug is turned more than 180° from the present heading (e.g., a 270° turn to the right). However, Selected Heading changes of more than 330° at a time result in turn reversals.

Figure 6-23 Heading Select Mode

Navigation Mode (GPS, VOR, LOC)

***NOTE:** The selected navigation receiver must have a valid VOR or LOC signal or active GPS course for the flight director to enter Navigation Mode.*

Pressing the **NAV** Key selects Navigation Mode. Navigation Mode acquires and tracks the selected navigation source (GPS, VOR, LOC). The flight director follows GPS roll steering commands when GPS is the selected navigation source. When the navigation source is VOR or LOC, the flight director creates roll steering commands from the Selected Course and deviation.

If the Course Deviation Indicator (CDI) shows greater than one dot when the **NAV** Key is pressed, the selected mode is armed. The armed annunciation appears in white to the left of the active lateral mode. For cases where the projected course is offset a large distance from the present course for turn anticipation, GPS Navigation Mode can be activated with crosstrack error up to 10 nm.

Figure 6-25 GPS Navigation Mode Armed

When the CDI has automatically switched from GPS to LOC during a LOC/ILS approach, GPS Navigation Mode remains active, providing GPS steering guidance until the localizer signal is captured. LOC Navigation Mode is armed automatically when the navigation source switch takes place if the **APR** Key is not pressed prior to the automatic source switch.

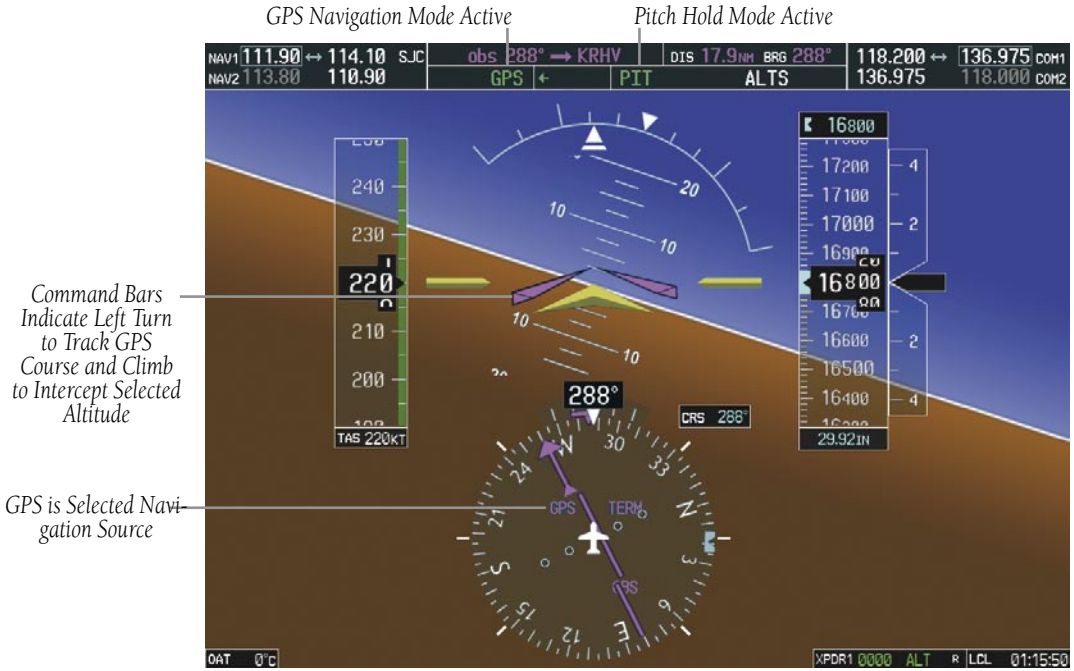


Figure 6-24 Navigation Mode

If Navigation Mode is active and either of the following occur, the flight director reverts to Roll Hold Mode (wings rolled level):

- Different VOR tuned while in VOR Navigation Mode (VOR Navigation Mode reverts to armed)
- Navigation source manually switched (with the **CDI** Softkey)
- FAF crossed while in GPS Navigation Mode after the automatic navigation source switch from GPS to LOC

Changing the Selected Course

The Selected Course on each PFD is controlled using the **CRS1** and **CRS2** knobs. Pressing the **CWS** Button and hand-flying the aircraft does not change the Selected Course while in Navigation Mode. The autopilot guides the aircraft back to the Selected Course (or GPS flight plan) when the **CWS** Button is released.

Approach Mode (GPS, VAPP, LOC)

NOTE: *The selected navigation receiver must have a valid VOR or LOC signal or active GPS course for the flight director to enter Approach Mode.*

Approach Mode is activated when the **APR** Key is pressed. Approach Mode acquires and tracks the selected navigation source (GPS, VOR, or LOC), depending on loaded approach. This mode uses the selected navigation receiver deviation and desired course inputs to fly the approach. Pressing the **APR** Key when the CDI is greater than one dot arms the selected approach mode (annunciated in white to the left of the active lateral mode).

VOR Approach Mode (VAPP) provides greater sensitivity for signal tracking than VOR Navigation Mode.

Selecting VOR Approach Mode

1) Ensure a valid VOR frequency is tuned
2) Ensure that VOR is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
3) Press the **APR** Key.

   When GPS Approach Mode is armed, Glidepath Mode is also armed. If GPS Approach Mode is selected while in GPS Navigation Mode, capture can occur with crosstrack error of up to 2 nm.

Selecting GPS Approach Mode

1) Ensure a GPS approach is loaded into the active flight plan. The active waypoint must be part of the flight plan (cannot be a direct-to a waypoint not in the flight plan).
2) Ensure that GPS is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
3) Press the **APR** Key.

Figure 6-26 GPS Approach Mode Armed

LOC Approach Mode allows the autopilot to fly a LOC/ILS approach with a glideslope. When LOC Approach Mode is armed, Glideslope Mode is also armed automatically. LOC captures are inhibited if the difference between aircraft heading and localizer course exceeds 105°.

Selecting LOC Approach Mode

1) Ensure a valid localizer frequency is tuned.
2) Ensure that LOC is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
3) Press the **APR** Key.

Or:

1) Ensure that GPS is the selected navigation source (use the **CDI** Softkey to cycle through navigation sources if necessary).
2) Ensure a LOC/ILS approach is loaded into the active flight plan.
3) Ensure the corresponding LOC frequency is tuned.
4) Press the **APR** Key.

If the following occurs, the flight director reverts to Roll Hold Mode (wings rolled level):

- Approach Mode is active and a Vectors-To-Final is activated
- Approach Mode is active and Navigation source is manually switched
- GPS Navigation Mode is active and the FAF is crossed after the automatic navigation source switch from GPS to LOC

Changing the Selected Course

The Selected Course on each PFD is controlled using the **CRS1** and **CRS2** knobs. Pressing the **CWS** Button and hand-flying the aircraft does not change the Selected Course while in Approach Mode. The autopilot guides the aircraft back to the Selected Course (or GPS flight plan) when the **CWS** Button is released.

Backcourse Mode (BC)

NOTE: *When making a backcourse approach, set the Selected Course to the localizer front course.*

Backcourse Mode captures and tracks a localizer signal in the backcourse direction. The mode may be selected by pressing the **BC** Key. Backcourse Mode is armed if the CDI is greater than one dot when the mode is selected. The flight director creates roll steering commands from the Selected Course and deviation when in Backcourse Mode.

Changing the Selected Course

The Selected Course on each PFD is controlled independently using the **CRS1** and **CRS2** knobs. Pressing the **CWS** Button and hand-flying the aircraft does not reset any reference data while in Backcourse Mode. The autopilot guides the aircraft back to the Selected Course (or GPS flight plan) when the **CWS** Button is released.

Figure 6-27 Backcourse Mode

6.5 AUTOPILOT AND YAW DAMPER OPERATION

NOTE: Refer to the AFM for specific instructions regarding emergency procedures.

The autopilot controls the aircraft pitch and roll attitudes following commands received from the flight director. Pitch autotrim provides trim commands to the pitch trim servo to relieve any sustained effort required by the pitch servo. Autopilot operation is independent of the yaw damper for the Socata TBM 850.

The yaw damper reduces Dutch roll tendencies and coordinates turns. It can operate independently of the autopilot and may be used during normal hand-flight maneuvers. Yaw rate commands are limited to 6 deg/sec by the yaw damper.

Flight Control

Pitch and roll commands are provided to the servos based on the active flight director modes. Yaw damping is provided by the yaw servo. Servo motor control limits the maximum servo speed and torque. The servo gearboxes are equipped with slip-clutches set to certain values. This allows the servos to be overridden in case of an emergency.

Pitch Axis and Trim

The autopilot pitch axis uses pitch rate to stabilize the aircraft pitch attitude during upsets and flight director maneuvers. Flight director pitch commands are rate- and attitude-limited, combined with pitch damper control, and sent to the pitch servo motor. The pitch servo measures the output effort (torque) and provides this signal to the pitch trim servo. The pitch trim servo commands the motor to reduce the average pitch servo effort.

When the autopilot is not engaged, the pitch trim servo may be used to provide manual electric pitch trim (MEPT). This allows the aircraft to be trimmed using a control wheel switch rather than the trim wheel. Manual trim commands are generated only when both halves of the **MEPT** Switch are operated simultaneously. Trim speeds are scheduled with airspeed to provide more consistent response.

Roll Axis

The autopilot roll axis uses roll rate to stabilize aircraft roll attitude during upsets and flight director maneuvers. The flight director roll commands are rate- and attitude-limited, combined with roll damper control, and sent to the roll servo motor.

Yaw Axis and Trim

The yaw damper uses yaw rate and roll attitude to dampen the aircraft's natural Dutch roll response. It also uses lateral acceleration to coordinate turns. Yaw damper operation is independent of autopilot engagement.

When the yaw damper is not engaged, the yaw trim adapter may be used to provide manual electric yaw trim (MEYT). This allows the aircraft to be trimmed using a control wheel switch. Trim speeds are scheduled with airspeed to provide more consistent response.

Engagement

*NOTE: Autopilot engagement/disengagement is not equivalent to servo engagement/disengagement. Use the **CWS** Button to disengage the pitch and roll servos while the autopilot remains active.*

When the **AP** Key is pressed, the autopilot, yaw damper, and flight director (if not already active) are activated and the annunciator lights on the AFCS controller for the autopilot and yaw damper are illuminated. The flight director engages in Pitch and Roll Hold Modes when initially activated.

Figure 6-28 Autopilot and Yaw Damper Engaged

When the **YD** Key is pressed, the system engages the yaw damper independently of the autopilot and the yaw damper annunciator light is illuminated.

Autopilot and yaw damper status are displayed in the center of the AFCS Status Box. Engagement is indicated by green 'AP' and 'YD' annunciations, respectively.

Control Wheel Steering

During autopilot operation, the aircraft may be hand-flown without disengaging the autopilot. Pressing and holding the **CWS** Button disengages the pitch and roll servos from the flight control surfaces and allows the aircraft to be hand-flown. At the same time, the flight director is synchronized to the aircraft attitude during the maneuver. CWS activity has no effect on yaw damper engagement.

The 'AP' annunciation is temporarily replaced by 'CWS' in white for the duration of CWS maneuvers.

Figure 6-29 CWS Annunciation

In most scenarios, releasing the **CWS** Button reengages the autopilot with a new reference. Refer to flight director mode descriptions for specific CWS behavior in each mode.

Disengagement

***NOTE:** Pressing the **AP** Key does not disengage the yaw damper.*

The autopilot may be manually disengaged by pushing the **AP DISC**, **GA**, **MEPT ARM** Switch, adjusting **ROLL TRIM**, or pressing the **AP** Key on the AFCS Control Unit. Manual disengagement is indicated by a five-second flashing yellow 'AP' annunciation and a three-second autopilot disconnect aural alert. The **AP DISC** or **MEPT** ARM Switch may be used to cancel the aural alert.

Figure 6-30 Manual Autopilot Disengagement

The **YD** Key and **MEYT** Switch can be used to disengage the yaw damper. The 'YD' annunciation turns yellow and flash for 5 seconds upon disengagement.

Figure 6-31 Yaw Damper Disengagement

Automatic autopilot disengagement is indicated by a flashing red and white 'AP' annunciation and by the autopilot disconnect aural alert, which continue until acknowledged by pushing the **AP DISC** or **MEPT** ARM Switch. Automatic autopilot disengagement occurs due to:

- System failure
- Invalid sensor data
- Exceeding maximum commanded pitch and roll angles
- Stall warning
- Inability to compute default flight director modes (FD also disengages automatically)

Yaw damper disengagement is indicated by a five-second flashing yellow 'YD' annunciation. Automatic yaw damper disengagement occurs when autopilot disengagement is caused by failure in a parameter also affecting the yaw damper. This means the yaw damper can remain operational in some cases where the autopilot automatically disengages. A localized failure in the yaw damper system or invalid sensor data also cause yaw damper disengagement.

Figure 6-32 Automatic Autopilot and Yaw Damper Disengagement

6.6 PROCEDURES

NOTE: *The diagrams in this section are for instructional purposes only and should not be used for navigation. Numbered portions of accompanying diagrams correspond to numbered procedure steps.*

This section provides a scenario-based set of procedures showing various GFC 700 AFCS modes used while following a previously entered flight plan. The following example closely follows the example flight plan discussed in the Navigation section. Refer to the example in the Navigation section when studying the this example.

In this scenario, the aircraft departs Charles B. Wheeler Downtown Airport (KMKC), enroute to Colorado Springs Airport (KCOS). After departure, the aircraft climbs to 12,000 ft and airway V4 is intercepted after following heading vectors of 240° and 290° assigned by ATC . Airway V4 is flown to Salina VOR (SLN) using VOR navigation, then airway V244 is flown using a GPS flight plan. The ILS approach for runway 35L and LPV (WAAS) approach for runway 35R are shown and a missed approach is executed.

Departure

Climbing to the Selected Altitude and flying an assigned heading:

1) Depart KMKC:

a) Use the **ALT SEL** Knob to set the Selected Altitude to 12,000 feet before takeoff.

b) Push the **GA** Switch to activate Takeoff Mode. The flight director Command Bars establish a 7.5° climb to follow.

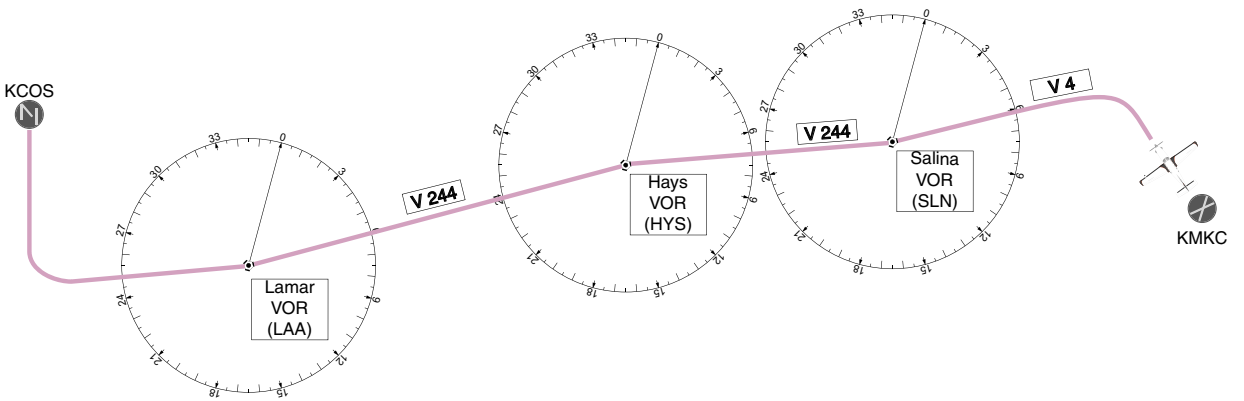


Figure 6-33 Flight Plan Overview

2) In this example, Vertical Speed Mode is used to capture the Selected Altitude (Pitch Hold, Vertical Speed, or Flight Level Change Mode may be used).

a) Adjust the aircraft's vertical speed to the desired 500 fpm.

b) Press the **VS** Key to activate Vertical Speed and Roll Hold modes and arm Selected Altitude Capture Mode.

The Vertical Speed Reference may be adjusted after Vertical Speed Mode is selected using the **NOSE UP/DN** Wheel or pushing the **CWS** Button while hand-flying the aircraft to establish a new Vertical Speed Reference.

c) Press the **AP** Key to engage the autopilot in a climb using Vertical Speed Mode.

3) Use the **HDG** Knob to set the Selected Heading, complying with ATC vectors to intercept Airway V4.

Press the **HDG** Key to activate Heading Select Mode while the autopilot is engaged in the climb. The autopilot follows the Selected Heading Bug on the HSI and turns the aircraft to the desired heading.

4) As the aircraft nears the Selected Altitude, the flight director transitions to Selected Altitude Capture Mode, indicated by the green 'ALTS' annunciation flashing for up to 10 seconds.

At 50 feet from the Selected Altitude, the green 'ALT' annunciation flashes for up to 10 seconds; the autopilot transitions to Altitude Hold Mode and levels the aircraft.

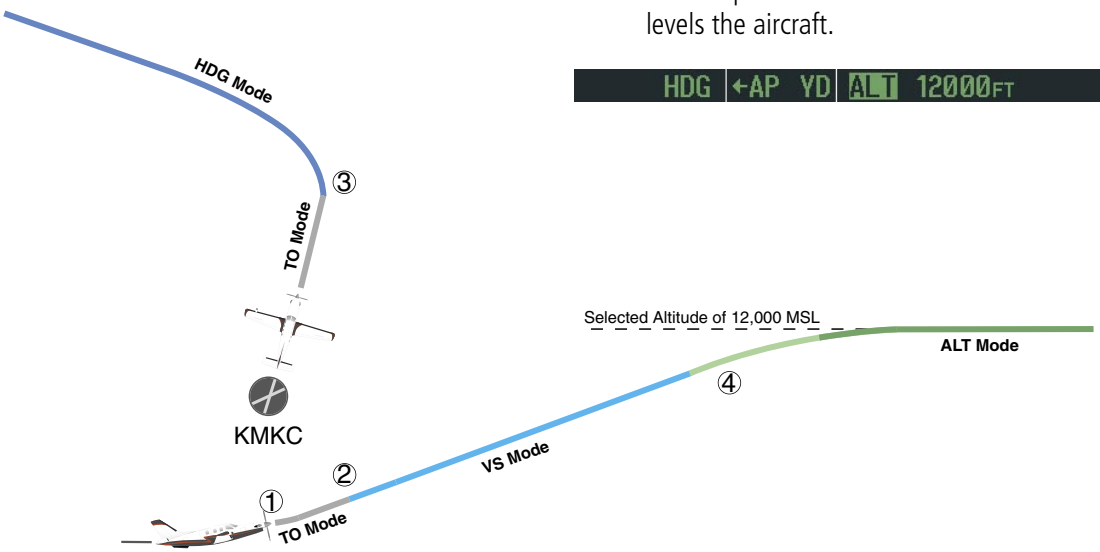


Figure 6-34 Departure

Intercepting a VOR Radial

During climb-out, the autopilot continues to fly the aircraft in Heading Select Mode. Airway V4 to Salina VOR (SLN) should now be intercepted. Since the enroute flight plan waypoints correspond to VORs, flight director Navigation Mode using either VOR or GPS as the navigation source may be used. In this scenario, VOR Navigation Mode is used for navigation to the first VOR waypoint in the flight plan.

Intercepting a VOR radial:

1) Arm VOR Navigation Mode:

a) Tune the VOR frequency.

b) Select the **CDI** Softkey to set the navigation source to VOR.

c) Use the **CRS1** or **CRS2** Knob to set the Selected Course to 255°. Note that at this point, the flight director is still in Heading Select Mode and the autopilot continues to fly 290°.

d) Press the **NAV** Key. This arms VOR Navigation Mode and the white 'VOR' annunciation appears to the left of the active lateral mode.

2) Once the flight director calculates the proper capture point, the flight director transitions from Heading Select to VOR Navigation Mode and the 'VOR' annunciation flashes green. The autopilot begins turning to intercept the Selected Course.

3) The autopilot continues the turn until the aircraft is established on the Selected Course.

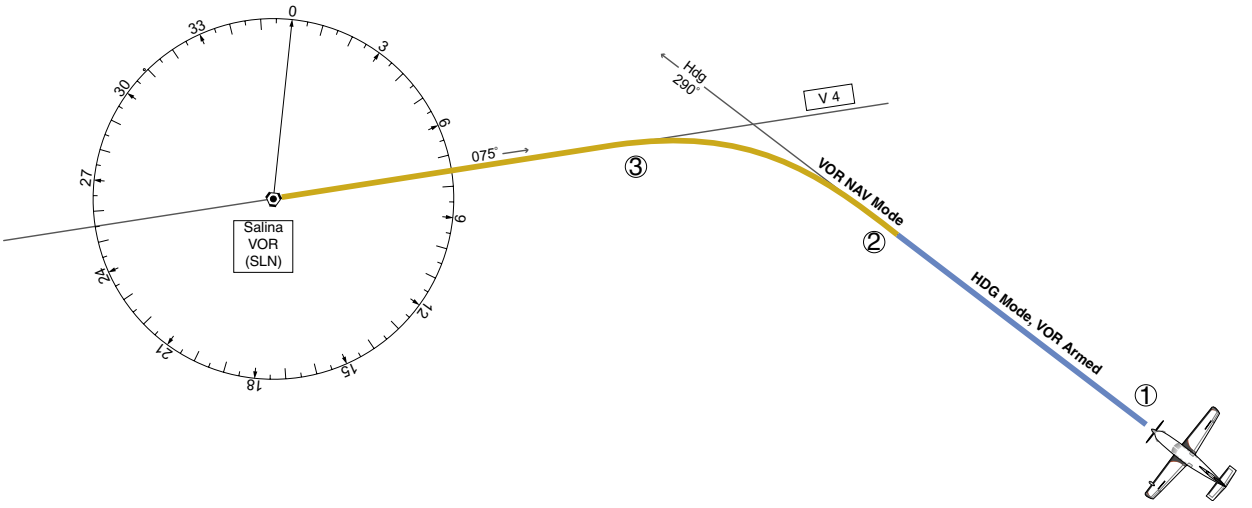


Figure 6-35 Intercepting a VOR Radial

Flying a Flight Plan/GPS Course

NOTE: *Changing the navigation source cancels Navigation Mode and causes the flight director to revert back to Roll Hold Mode (wings rolled level).*

As the aircraft closes on Salina VOR, GPS is used to navigate the next leg, airway V244. The aircraft is currently tracking inbound on Airway V4.

Flying a GPS flight plan:

1) Transition from VOR to GPS Navigation Mode:
   a) Select the **CDI** Softkey until GPS is the selected navigation source.
   b) Press the **NAV** Key to activate GPS Navigation Mode. The autopilot guides the aircraft along the active flight plan leg.

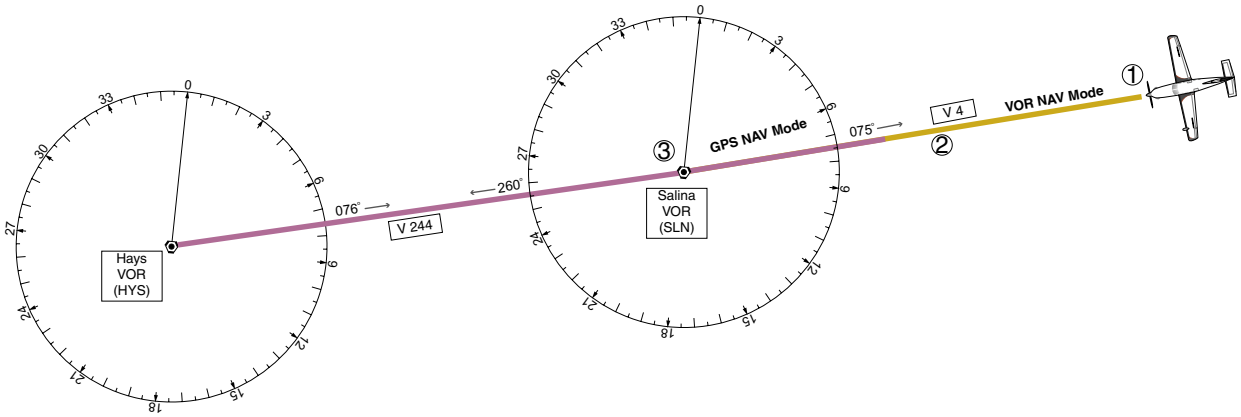


Figure 6-36 Transition to GPS Flight Plan

2) Following the flight plan, the autopilot continues to steer the aircraft under GPS guidance. Note that in GPS Navigation Mode, course changes defined by the flight plan are automatically made without pilot action required.

Descent

While flying the arrival procedure, the aircraft is cleared for descent in preparation for the approach to KCOS. Three methods are presented for the descent from 12,000 ft:

- Flight Level Change descent – Flight Level Change Mode can be used to descend to the Selected Altitude at a constant airspeed. This descent method does not account for flight plan waypoint altitude constraints.
- Vertical Path Tracking descent – Vertical Path Tracking Mode is used to follow the vertical descent path defined in the GPS flight plan. Altitude constraints correspond to waypoints in the flight plan. Before VNV flight control can provide vertical profile guidance, a VNV flight plan must be entered and enabled.
- Non-path descent in a VNV scenario – While the flight director is following VNV guidance for descent, Pitch Hold, Vertical Speed, or Flight Level Change Mode can be used to descend to the VNV Target Altitude prior to reaching the planned TOD. Flight Level Change Mode is used in the example.

Flight Level Change descent:

1) Select Flight Level Change Mode:

a) Using the **ALT SEL** Knob, set the Selected Altitude to 10,000 feet.

b) Press the **FLC** Key to activate Flight Level Change Mode. The annunciation 'FLC' appears next to the Airspeed Reference, which defaults to the current aircraft airspeed. Selected Altitude Capture Mode is armed automatically.

c) Press the **SPD** Key to display the Airspeed Reference in Mach.

2) Use the **NOSE UP/NOSE DN** keys or push the **CWS** Button while hand-flying the aircraft to adjust the commanded airspeed while maintaining the same power, or reduce power to allow descent in Flight Level Change Mode while the autopilot maintains the current airspeed.

3) As the aircraft nears the Selected Altitude, the flight director transitions to Selected Altitude Capture Mode, indicated by the green 'ALTS' annunciation flashing for up to 10 seconds.

The green 'ALT' annunciation flashes for up to 10 seconds upon reaching 50 feet from the Selected Altitude; the autopilot transitions to Altitude Hold Mode and levels the aircraft.

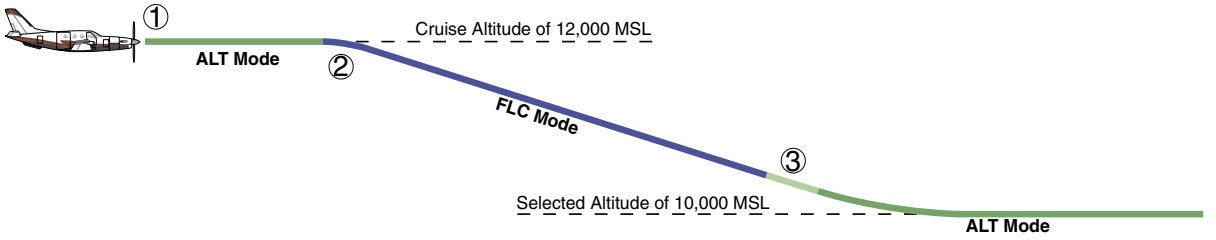


Figure 6-37 FLC Descent

Vertical Path Tracking descent to VNV Target Altitude:

1) Select VNV flight control:

a) Press the **VNV** Key to arm Vertical Path Tracking Mode. The white annunciation 'VPTH' appears.

b) Using the **ALT** Knob, set the Selected Altitude at least 75 feet below the flight plan's VNV Target Altitude of 10,000 feet. This altitude was entered in the flight plan as a component of an offset waypoint from OPSHN intersection as indicated in the example flight plan in the Navigation section.

If the Selected Altitude is not adequately adjusted below the VNV Target Altitude, the flight director will command descent to the Selected Altitude rather than the VNV Target Altitude once Vertical Path Tracking Mode becomes active (ALTS is armed rather than ALTV).

c) If Vertical Path Tracking Mode is armed more than 5 minutes prior to descent path capture, acknowledgment is required for the flight director to transition from Altitude Hold to Vertical Path Tracking Mode. To proceed with descent path capture if the white 'VPTH' annunciation begins flashing, do one of the following:

- Turn the ALT Knob to adjust the Selected Altitude
- Press the **VNV** Key

If the descent is not confirmed by the time of interception, Vertical Path Tracking Mode remains armed and the descent is not captured.

2) When the top of descent (TOD) is reached, the flight director transitions to Vertical Path Tracking Mode and begins the descent to the VNV Target Altitude. Intention to capture the VNV Target Altitude is indicated by the white 'ALTV' annunciation.

3) As the aircraft nears the VNV Target Altitude, the flight director transitions to VNV Target Altitude Capture Mode, indicated by the green 'ALTV' annunciation flashing for up to 10 seconds.

The green 'ALT' annunciation flashes for up to 10 seconds upon reaching 50 feet from the VNV Target Altitude; the autopilot transitions to Altitude Hold Mode and levels the aircraft at the vertical waypoint.

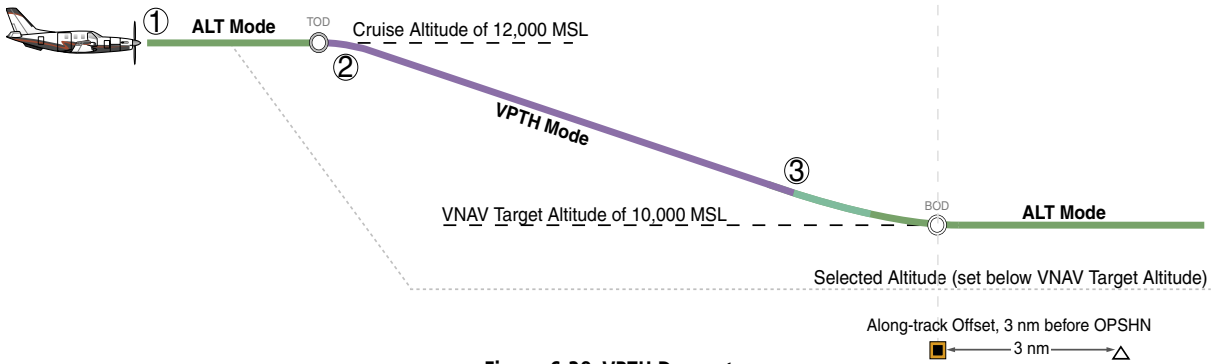


Figure 6-38 VPTH Descent

Non-path descent using Flight Level Change Mode:

1) Command a non-path descent using Flight Level Change Mode:

   a) Using the **ALT** Knob, set the Selected Altitude below the current aircraft altitude to an altitude (in this case, 9,400 feet) at which to level off between VNV flight plan altitudes.

   b) Press the **FLC** Key before the planned TOD during an altitude hold while VPTH is armed. The Airspeed Reference defaults to the current aircraft airspeed. Vertical Path Tracking and Selected Altitude Capture Mode are armed automatically.

GPS | ←AP YD | FLC 184KT ALTS VPTH

2) Reduce power to allow descent in Flight Level Change Mode. The autopilot maintains the Airspeed Reference.

3) As the aircraft nears the Selected Altitude, the flight director transitions to Selected Altitude Capture Mode, indicated by the green 'ALTS' annunciation flashing for up to 10 seconds.

GPS | ←AP YD | ALTS 9400FT ALT VPTH

The green 'ALT' annunciation flashes for up to 10 seconds upon reaching 50 feet from the Selected Altitude; the autopilot transitions to Altitude Hold Mode and levels the aircraft.

GPS | ←AP YD | ALT 9400FT VPTH

4) When the next TOD is reached, Vertical Path Tracking becomes active (may require acknowledgment to allow descent path capture).

GPS | ←AP YD | VPTH ALTV

5) As the aircraft nears the VNV Target Altitude, the flight director transitions to VNV Target Altitude Capture Mode, indicated by the green 'ALTV' annunciation flashing for up to 10 seconds.

GPS | ←AP YD | ALTV 9000FT ALT

The green 'ALT' annunciation flashes for up to 10 seconds upon reaching 50 feet from the VNV Target Altitude; the autopilot transitions to Altitude Hold Mode and levels the aircraft at the vertical waypoint.

GPS | ←AP YD | ALT 9000FT

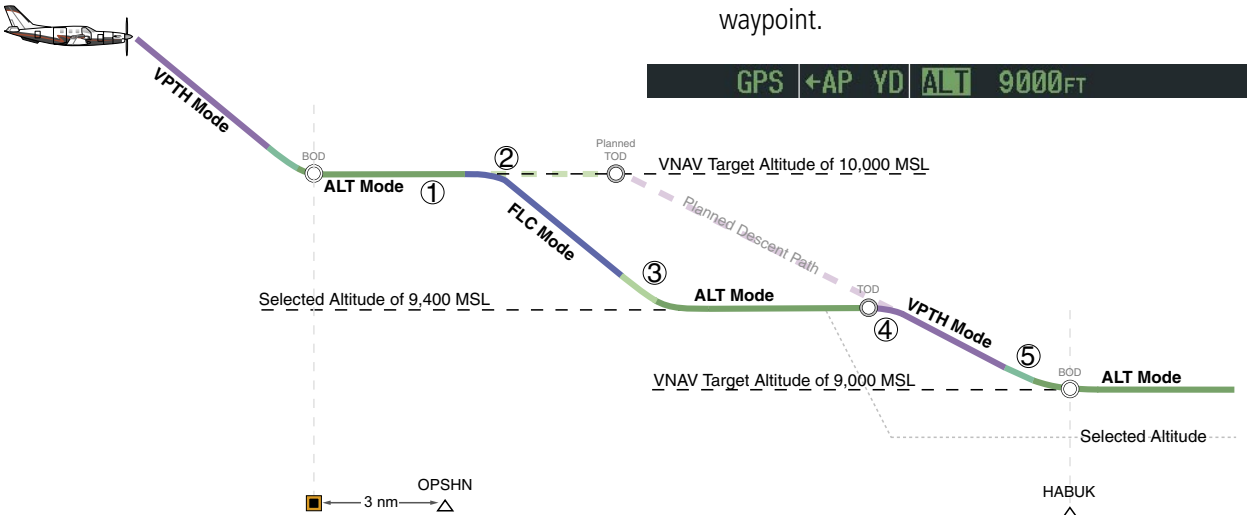


Figure 6-39 Non-path Descent

Approach

Flying an ILS approach:

1) Transition from GPS Navigation Mode to Heading Select Mode.
   a) Select the Runway 35L ILS approach for KCOS into the flight plan and select 'VECTORS' for the transition.
   b) Use the **HDG** Knob to set the Selected Heading after getting vectors from ATC.
   c) Press the **HDG** Key. The autopilot turns the aircraft to the desired heading.
   d) Use Heading Select Mode to comply with ATC vectors as requested.

2) Arm LOC Approach and Glideslope modes.
   a) Ensure the appropriate localizer frequency is tuned.
   b) Press the **APR** Key when cleared for approach to arm Approach and Glideslope modes. 'LOC' and 'GS' appear in white as armed mode annunciations.

   c) The navigation source automatically switches to LOC. After this switch occurs, the localizer signal can be captured and the flight director determines when to begin the turn to intercept the final approach course. The flight director now provides guidance to the Missed Approach Point.

3) There are two options available at this point, as the autopilot flies the ILS approach:
   - Push the **AP DISC** Switch at the decision height and land the aircraft.
   - Use the **GA** Switch to execute a missed approach.

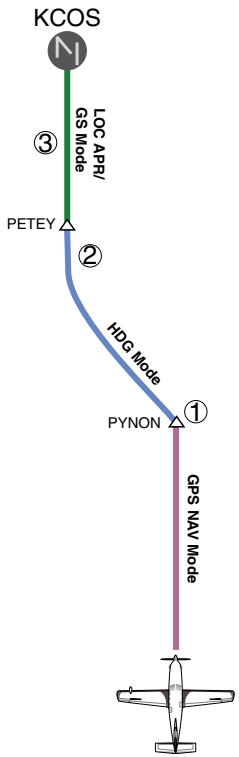


Figure 6-40 ILS Approach to KCOS

Flying a WAAS precision approach:

1) Arm flight director modes for a precision approach:
   a) Make sure the navigation source is set to GPS (use **CDI** Softkey to change navigation source).
   b) Select the Runway 35R LPV approach for KCOS into the flight plan.
2) Press the **APR** Key once clearance for approach has been acquired. GPS Approach Mode is activated and Glidepath Mode is armed.

3) Once the glidepath is captured, Glidepath Mode becomes active. The flight director now provides guidance to the Missed Approach Point.

4) There are two options available at this point, as the autopilot flies the approach:
   - Push the **AP DISC** Switch at the Decision height and land the aircraft.
   - Use the **GA** Switch to execute a missed approach.

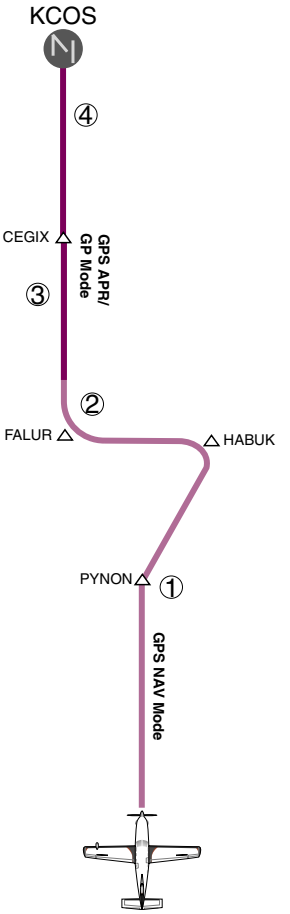


Figure 6-41 LPV Approach to KCOS

Go Around/Missed Approach

Flying a missed approach:

1) Push the **GA** Switch at the Decision height and apply full power to execute a missed approach. The flight director Command Bars establish a nose-up climb to follow.

   Note that when the **GA** Switch is pushed, the missed approach is activated and the autopilot disconnects, indicated by the 'AP' annunciation flashing yellow for 5 seconds.

2) Start the climb to the prescribed altitude in the published Missed Approach Procedure (in this case, 10,000 ft).

   a) Press the **AP** Key to re-engage the autopilot.

   b) If navigating an ILS approach, select the **CDI** Softkey to select GPS as the navigation source. This is not necessary when navigating a GPS approach.

   c) Select the **SUSP** Softkey to begin navigating to the Missed Approach Hold Point.

   d) Press the **NAV** Key to have the autopilot fly to the hold.

3) Use the **ALT** Knob to set a Selected Altitude to hold.

   To hold the current airspeed during the climb, press the **FLC** Key.

   As the aircraft nears the Selected Altitude, the flight director transitions to Selected Altitude Capture Mode, indicated by the green 'ALTS' annunciation flashing for up to 10 seconds.

   The green 'ALT' annunciation flashes for up to 10 seconds upon reaching 50 feet from the Selected Altitude; the autopilot transitions to Altitude Hold Mode and levels the aircraft.

NOTE: *As a result of calculations performed by the system while flying the holding pattern, the display may re-size automatically and the aircraft may not precisely track the holding pattern.*

4) The autopilot flies the holding pattern after the missed approach is activated. Annunciations are displayed in the Navigation Status Box, above the AFCS Status Box.

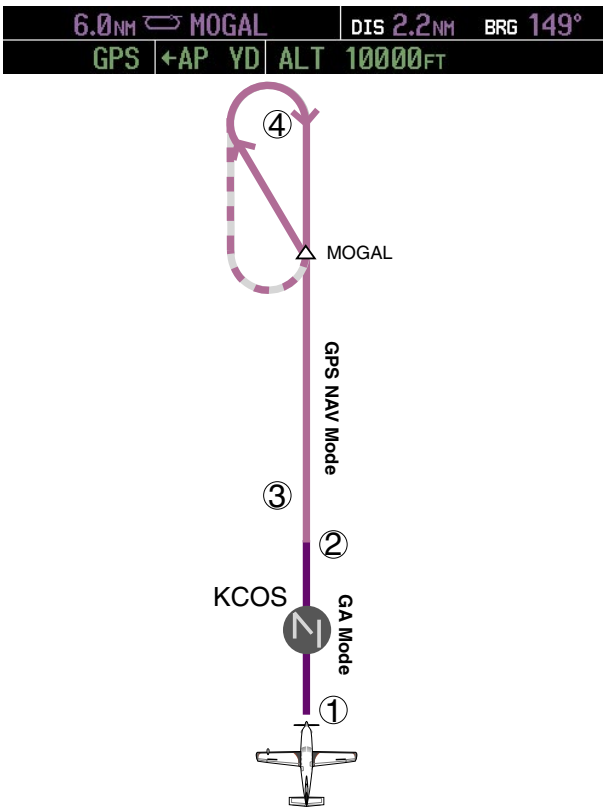


Figure 6-42 Go Around/Missed Approach (GPS 35R KCOS

6.7 AFCS ANNUNCIATIONS AND ALERTS

AFCS Status Alerts

The annunciations in Table 6-4 (listed in order of increasing priority) can appear on the PFDs above the Airspeed and Attitude indicators. Only one annunciation may occur at a time, and messages are prioritized by criticality.

Figure 6-43 AFCS Status Annunciation

Alert Condition	Annunciation	Description
Rudder Mistrim Right	RUD→	Yaw servo providing sustained force in the indicated direction
Rudder Mistrim Left	←RUD	
Aileron Mistrim Right	AIL→	Roll servo providing sustained force in the indicated direction
Aileron Mistrim Left	←AIL	
Elevator Mistrim Down	↓ELE	Pitch servo providing sustained force in the indicated direction
Elevator Mistrim Up	↑ELE	
Pitch Trim Failure (or stuck **MEPT** Switch)	PTRM	If AP engaged, take control of the aircraft and disengage AP If AP disengaged, move **MEPT** switches separately to unstick
Yaw Trim Failure (or stuck **MEYT** Switch)	YTRM	If AP engaged, take control of the aircraft and disengage AP If AP disengaged, move the **MEYT** switch to unstick
Yaw Damper Failure	YAW	YD control failure; AP still operative
Roll Failure	ROLL	Roll axis control failure; AP inoperative
Pitch Failure	PTCH	Pitch axis control failure; AP inoperative
System Failure	AFCS	AP and MEPT are unavailable; FD may still be available
Preflight Test	PFT	Performing preflight system test; aural alert sounds at completion Do not press the **AP DISC** Switch during servo power-up and preflight system tests as this may cause the preflight system test to fail or never to start (if servos fail their power-up tests). Power must be cycled to the servos to remedy the situation.
	PFT	Preflight system test failed; aural alert sounds at failure

Table 6-4 AFCS Status Alerts

Overspeed Protection

While Pitch Hold, Vertical Speed, Flight Level Change, Vertical Path Tracking, or an altitude capture mode is active, airspeed is monitored by the flight director and pitch commands are limited for overspeed protection. Overspeed protection is provided in situations where the flight director cannot acquire and maintain the mode reference for the selected vertical mode without exceeding the certified maximum autopilot airspeed.

When an autopilot overspeed condition occurs, the Airspeed Reference appears in a box above the Airspeed Indicator, flashing a yellow 'MAXSPD' annunciation. Engine power should be reduced as pitch is adjusted by the autopilot to slow the aircraft. The annunciation disappears when the overspeed condition is resolved.

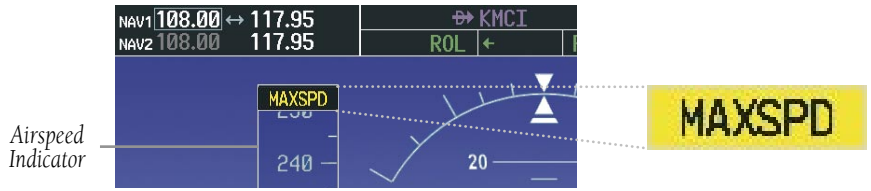


Figure 6-44 Overspeed Annunciation

Blank Page

SECTION 7: NAVIGATION

The majority of the following discussions pertain to the Multi Function Display. In discussions pertaining to the PFD, the controls are located on the PFD.

7.1 NAVIGATION MAP PAGE

***WARNING:** The map display should only be used for situational awareness. Any map display indication should be compared with approved navigation sources.*

Select the MAP Page Group

1) Turn the large **FMS** Knob until 'MAP' is highlighted in the page group box in the lower right of the MFD display.
2) Turn the small **FMS** Knob to select the first MAP page (indicated by a solid rectangular icon).

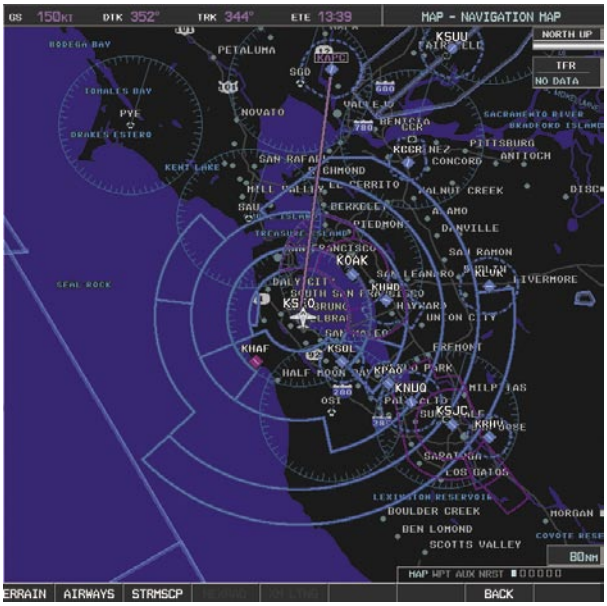


Figure 7-1 Navigation Map Page (Enroute)

7.2 DIRECT-TO NAVIGATION

Direct-to Navigation from the MFD

Figure 7-2 MFD Direct-to Window

Enter a Direct-to Destination

1) Press the **Direct-to** (D▸) Key.
2) Enter the destination waypoint identifier.
3) Press the **ENT** Key to confirm the identifier. The 'Activate?' field is highlighted.
4) If no altitude constraint or course is desired, press the **ENT** Key to activate. To enter an altitude contraint, proceed to step 5.
5) Turn the large **FMS** Knob to place the cursor over the 'VNV' altitude field.
6) Enter the desired altitude.
7) Press the **ENT** Key. The option to select 'MSL' or 'AGL 'is now displayed.
8) Turn the small **FMS** Knob to select 'MSL' or 'AGL'.

9) Press the **ENT** Key. The cursor is placed in the 'VNV' offset distance field.

10) Enter the desired target altitude offset from the selected Direct-to.

11) Press the **ENT** Key to highlight 'Activate?' or turn the large **FMS** Knob to highlight the 'COURSE' field.

12) Enter the desired course to the waypoint.

13) Press the **ENT** Key to highlight 'ACTIVATE?'.

14) Press the **ENT** again to activate the Direct-to.

Select a Direct-to Destination to a Flight Plan Waypoint

1) While navigating an active flight plan, press the **Direct-to** (D▸) Key.

2) Turn the small **FMS** Knob to the left to display a list of flight plan waypoints as shown in Figure 7-3.

Figure 7-3 Flight Plan Waypoint List (MFD)

3) Turn the large **FMS** Knob to select the desired waypoint.

4) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.

5) Press **ENT** again to activate a Direct-to.

Select a Direct-to Destination to a Nearest Airport

1) Press the **Direct-to** (D▸) Key.

2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 7-3. The list is populated only when navigating a flight plan.

Figure 7-4 Nearest Airport List (MFD)

3) Turn the small **FMS** Knob to the right to display the 'NRST' airports to the aircraft's current position as shown in Figure 7-4.

4) Turn the large **FMS** Knob to select the desired airport.

5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.

6) Press **ENT** again to activate a Direct-to.

Select a Direct-to Destination to a Recently Entered Identifier

1) Press the **Direct-to** (D▸) Key.

2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 7-3. The list is populated only when navigating a flight plan.

Figure 7-5 Recently Entered Waypoints List (MFD)

3) Turn the small **FMS** Knob to the right to display the 'RECENT' waypoints as shown in Figure 7-5.
4) Turn the large **FMS** Knob to select the desired airport.
5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.
6) Press **ENT** again to activate a Direct-to.

Re-center the CDI to the Destination Waypoint

Press the **Direct-to** (D▸) Key, followed by pressing the **ENT** Key twice. If a missed approach point (MAP) is the current destination, the approach is canceled.

Manually Define the Active Direct-to

1) Press the **Direct-to** (D▸) Key.
2) Turn the large **FMS** Knob to highlight the 'VNV' altitude field.
3) Enter the desired altitude.
4) Press the **ENT** Key. The option to select 'MSL' or 'AGL' is now displayed.
5) Turn the small **FMS** Knob to select 'MSL' or 'AGL'.
6) Press the **ENT** Key. The cursor now highlights the VNV offset field.
7) Enter the desired the offset distance.
8) Press the **ENT** Key.
9) Turn the large **FMS** Knob to place the cursor in the 'COURSE' field.
10) Enter the desired course.
11) Press the **ENT** Key. The cursor now highlights 'ACTIVATE?'.
12) Press the **ENT** Key again to begin navigation using the selected destination, altitude constraint, and course.

Canceling Direct-to Navigation

1) Press the **Direct-to** (D▸) Key.
2) Press the **MENU** Key to display the Direct-to options menu.
3) With 'Cancel Direct-To NAV' highlighted, press the **ENT** Key. If a flight plan is still active, the G1000 resumes navigating the flight plan along the closest leg.

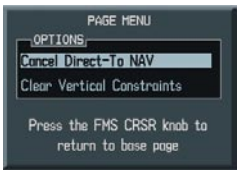


Figure 7-6 Canceling Direct-to Navigation

Direct-to Navigation from the PFD

Figure 7-7 PFD Direct-to Window

Enter a Direct-to Destination

1) Press the Direct-to Key ( ).
2) Turn the large **FMS** Knob to place the cursor in the desired selection field.
3) Turn the small **FMS** Knob to begin selecting the desired identifier, location, etc.
4) Press the **ENT** Key.
5) The cursor is now flashing on 'ACTIVATE?'. If no altitude constraint or course is desired, press the **ENT** Key to activate. To enter an altitude contraint, proceed to step 6.
6) Turn the large **FMS** Knob to place the cursor over the 'VNV' altitude field.
7) Turn the small **FMS** Knob to enter the desired VNV altitude.
8) Press the **ENT** Key. The option to select 'MSL' or 'AGL' is now displayed.
9) Turn the small **FMS** Knob to select 'MSL' or 'AGL'.
10) Press the **ENT** Key. The cursor is placed in the 'VNV' offset distance field.
11) Turn the small **FMS** Knob to enter the desired target altitude offset from the selected Direct-to.
12) Press the **ENT** Key to highlight 'Activate?' or turn the large **FMS** Knob to highlight the 'COURSE' field.
13) Turn the small **FMS** Knob to enter the desired course to the waypoint.
14) Press the **ENT** Key to highlight 'ACTIVATE?'.
15) Press the **ENT** again to activate the Direct-to.

Select a Direct-to Destination to a Flight Plan Waypoint

1) While navigating an active flight plan, press the **Direct-to** ( ) Key.
2) Turn the small **FMS** Knob to the left to display a list of flight plan waypoints as shown in Figure 7-8.

Figure 7-8 Flight Plan Waypoint List (PFD)

3) Turn the large **FMS** Knob to select the desired waypoint.
4) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.
5) Press **ENT** again to activate a Direct-to.

Select a Direct-to Destination to a Nearest Airport

1) Press the **Direct-to** ( ) Key.
2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 7-8. The list is only populated when navigating a flight plan.

Figure 7-9 Nearest Airport List (PFD)

3) Turn the small **FMS** Knob to the right to display the 'NRST' airports to the aircraft's current position as shown in Figure 7-9.

4) Turn the large **FMS** Knob to select the desired airport.

5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.

6) Press **ENT** again to activate a Direct-to.

Select a Direct-to Destination to a Recently Entered Identifier

1) Press the **Direct-to** (D▸) Key.

2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 7-8. The list is only populated when navigating a flight plan.

Figure 7-10 Recently Entered Waypoints List (PFD)

3) Turn the small **FMS** Knob to the right to display the 'RECENT' waypoints as shown in Figure 7-10.

4) Turn the large **FMS** Knob to select the desired airport.

5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.

6) Press **ENT** again to activate a Direct-to.

Cancelling Direct-to Navigation

1) Press the Direct-to (D▸) Key.

2) Press the **MENU** Key to display the Options Window. The cursor flashes on 'Cancel Direct-to NAV'.

3) Press the **ENT** Key to cancel the direct-to.

7.3 NAVIGATING AN EXAMPLE FLIGHT PLAN

NOTE: *The following example flight plan is for instructional purposes only. All database information depicted should be considered not current.*

The following discussion is an example of navigating a flight plan with the WAAS capable GPS system while the G1000 provides vertical guidance through descents. A lateral flight plan (LNAV) would be navigated in much the same way, but would not include vertical guidance when the final approach course is active.

The example is a flight plan from KMKC to KCOS filed using the TIFTO2 departure, various Victor Airways, and the DBRY1 arrival with the transition at TBE. Enroute altitude will be 12,000 feet. An LPV (WAAS) approach will be selected for runway 35R. A missed approach will be executed at the Missed Approach Point (MAP). A few enroute changes are demonstrated.

NOTE: *If the loaded arrival procedure has published altitudes contained in the navigation database, these are for turbojet aircraft only. Accept or change these values as desired to meet the requirements of the clearance.*

1) Prior to departure, the TIFTO2 departure, the airways, and the DBRY1 arrival at KCOS are loaded. See the Procedures section for loading departures and arrivals. Note the magenta arrow in Figure 7-11 indicating the active departure leg.

   After takeoff, ATC assigns a heading of 240°.

2) Figure 7-11 shows the aircraft on the assigned heading of 240°. 'TERM' (Terminal) is the current CDI flight phase displayed on the HSI indicating 1.0 nm CDI scaling.

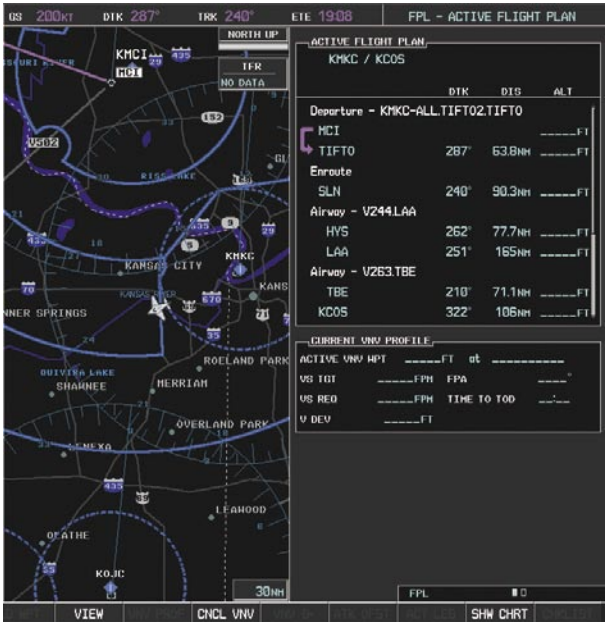


Figure 7-11 Assigned Heading of 240°

3) ATC now assigns routing to join V4. A heading of 290° is assigned to intercept V4. The aircraft turns to heading 290° as seen in Figure 7-12.

Figure 7-12 Assigned Heading of 290°

4) V4 is now be entered into the flight plan.

a) Press the **FMS** Knob to activate the cursor.

b) The desired entry point for V4 (TOP) must now be entered. Turn the large **FMS** Knob to highlight the desired flight plan insertion point as shown in Figure 7-13. The V4 entry point (TOP) will be placed immediately above the highlighted waypoint (SLN).

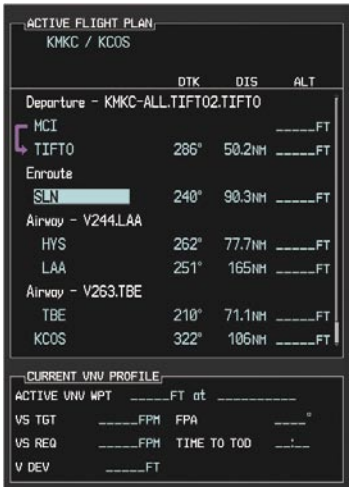


Figure 7-13 Begin Adding V4 to the Flight Plan

c) Turn the small **FMS** Knob to display the Waypoint Information Window. Enter the desired entry point for V4, in this case Topeka VOR (TOP) is used as shown in Figure 7-14.

Figure 7-14 Entering V4 Entry Point

d) Press the **ENT** Key. TOP is now inserted into the flight plan as in Figure 7-15.

Figure 7-15 TOP Inserted into the Flight Plan

e) With SLN still highlighted as in Figure 7-15, turn the small **FMS** Knob to the right. The Waypoint Information Page is displayed and the **LD AIRWY** Softkey is now available.

f) Select the **LD AIRWY** Softkey to display the list of available airways for TOP as seen in Figure 7-16.

Figure 7-16 List of Available Airways for TOP

g) Turn either **FMS** Knob to highlight V4 in the list as seen in Figure 7-16.

h) Press the **ENT** Key. The list of available exits for V4 is now displayed as in Figure 7-17.

Figure 7-17 List of Available Exits for V4

i) If necessary, turn either FMS Knob to select the desired exit. In this case Salina VOR (SLN) is selected as seen in Figure 7-17.

j) Press the **ENT** Key. The selected airway and exit are displayed the prompt "LOAD?" highlighted as in Figure 7-18.

Figure 7-18 Ready to Load V4

k) Press the **ENT** Key.

l) V4 is now loaded into the flight plan as shown in Figure 7-19.

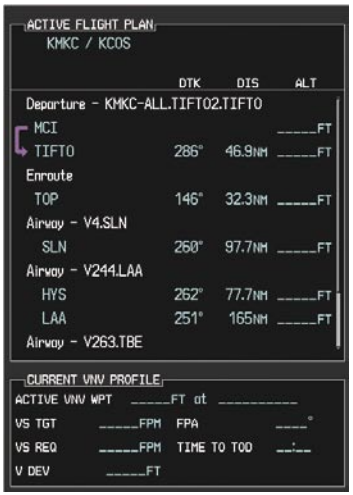


Figure 7-19 V4 is Loaded in the Flight Plan

5) V4 is now made the active leg of the flight plan.

a) Press the **FMS** Knob to activate the cursor.

b) Turn the large **FMS** Knob to highlight SLN. The TO waypoint of the leg is selected in order to activate the leg.

c) Select the **ACT LEG** Softkey. The confirmation window is now displayed as in Figure 7-20. Note the TOP to SLN leg is actually part of V4.

Figure 7-20 Comfirm Active Leg

d) Verify the displayed leg is the desired leg and press the **ENT** Key. Note in Figure 7-21, the magenta arrow in the flight plan window and magenta line on the map indicating V4 is now the active flight plan leg. Note also, the crosstrack (XTK) distance on the HSI indicating 16.9 nm to the intercept point. Note the phase of flight remained in Terminal (TERM) mode up to this point because a departure leg was active. Since a leg after the departure is now active, the current CDI flight phase is ENR (Enroute) and CDI scaling has changed to 2.0 nm.

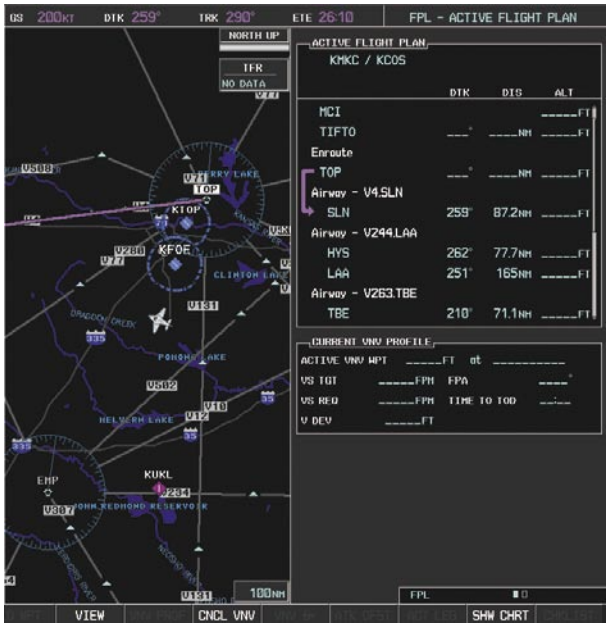


Figure 7-21 V4 Now Active Leg

6) The aircraft continues on heading 290°. When the crosstrack distance is less than 2.0 nm, the XTK disappears from the HSI and the CDI is positioned

on the last dot indicating a 2.0 nm distance from the centerline of the next course.

7) As the CDI approaches center, the aircraft turns onto the active leg as seen in Figure 7-22.

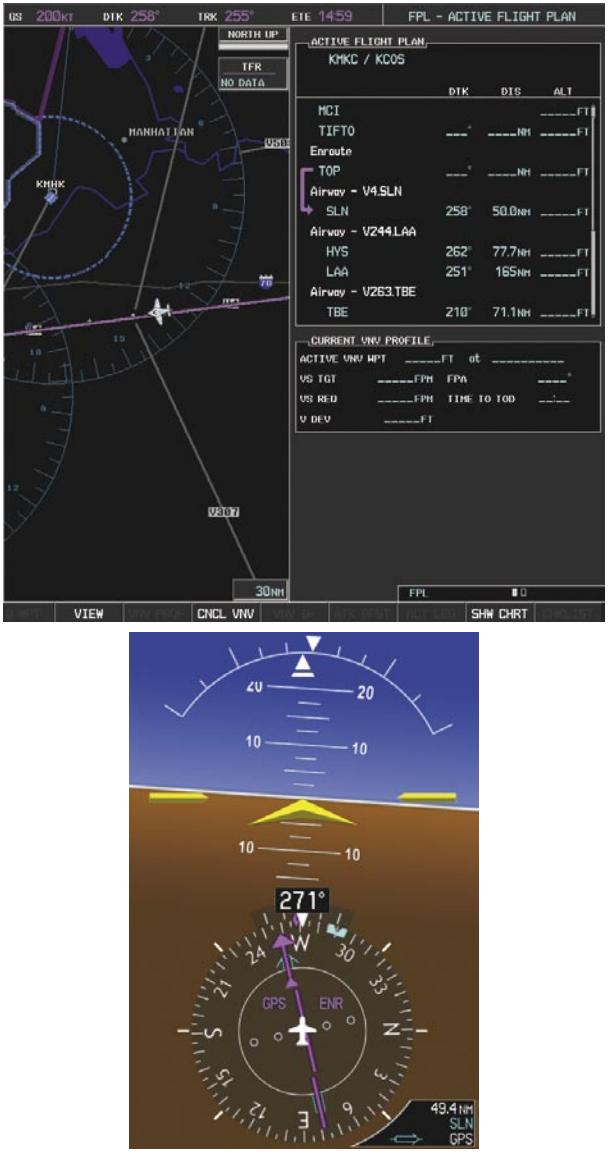


Figure 7-22 Turn on to Active Leg

8) At SLN, Victor Airway 244 (V244) is intercepted. Turn prompts are displayed in the PFD Navigation Status Box as seen in Figure 7-23.

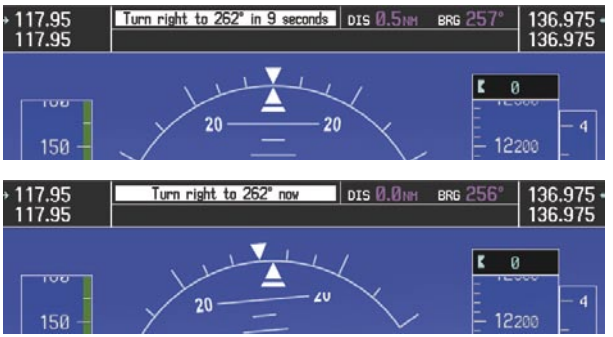


Figure 7-23 Turn to Intercept V244

9) As seen in Figure 7-24, V244 is now the active flight plan leg.

Figure 7-24 V244 Now Active Leg

10) At Lamar VOR (LAA) V263 is intercepted. See Figure 7-25.

Figure 7-25 HYS to LAA Leg Active

11) ATC grants clearance to proceed direct to OPSHN intersection to begin the arrival procedure. ATC advises to expect an altitude of 10,000 feet at OPSHN.

a) Press the **FMS** Knob to activate the cursor.

b) Turn the large **FMS** Knob to select OPSHN in the flight plan list.

c) Press the **Direct-to** (D▸) Key. The Direct-to Window is now displayed as shown in Figure 7-26.

Figure 7-26 Direct To OPSHN

d) Turn the large **FMS** Knob to place the cursor in the VNV altitude field as shown in Figure 7-27.

Figure 7-27 Enter VNV Altitude

e) An altitude of 10,000 feet is entered as requested by ATC.

f) Press the **ENT** Key. The cursor is now displayed in the VNV offset field as shown in Figure 7-28.

Figure 7-28 Enter VNV Offset Distance

g) Enter the offset, or distance from the waypoint at which the selected altitude will be reached. In this case, three miles prior to OPSHN is entered. In other words, the G1000 gives vertical guidance so the aircraft arrives at an altitude of 10,000 feet three miles prior to OPSHN.

h) Press the **ENT** Key twice to activate the direct-to. Note, in Figure 7-29, the magenta arrow indicating the direct-to OPSHN after the offset waypoint for OPSHN. The preceding offset waypoint indicates the offset distance and altitude that was previously entered. The remaining waypoints in the loaded arrival procedure have no database specified altitudes, therefore, dashes are displayed. Keep the CDI centered and maintain a track along the magenta line to OPSHN.

Note the Direct-to waypoint is within the loaded arrival procedure, therefore, phase of flight scaling for the CDI changes to Terminal Mode and is annunciated by displaying 'TERM' on the HSI.

NOTE: *If the loaded arrival procedure has waypoints with altitude constraints retrieved from the database that will be used as is, the altitude must be manually accepted by placing the cursor over the desired altitude, then pressing the **ENT** Key. The altitude is now displayed as light blue meaning it is now being used by the system to determine vertical speed and deviation guidance.*

Figure 7-29 Direct-to Active

12) The aircraft is proceeding to OPSHN. The expected approach is the RNAV LPV approach to runway 35R, so it is selected.

a) Press the **PROC** Key to display the Procedures Window.

b) 'SELECT APPROACH' should be highlighted as shown in Figure 7-30.

Figure 7-30 Procedures Window

c) Press the **ENT** Key. A list of available approaches for the destination airport is displayed as in Figure 7-31.

Figure 7-31 List of Available Approaches

d) Turn either **FMS** Knob to select the LPV approach for 35R as shown in Figure 7-31.

e) Press the **ENT** Key. A list of available transitions for the selected approach is displayed as shown on Figure 7-32.

Figure 7-32 List of Available Transitions

f) Turn either **FMS** Knob to select the desired transition. In this case, the Initial Approach Fix (IAF) at HABUK is used.

g) Press the **ENT** Key.

h) With 'LOAD?' highlighted, again press the **ENT** Key. The selected approach is added to the flight plan as seen in Figure 7-33.

Figure 7-33 Loaded Approach

13) Note the altitude constraints associated with each of the approach waypoints as seen in Figure 7-33. These altitudes are loaded from the database and are initially displayed as white text, indicating these values are not being used to compute vertical deviation guidance. The altitude values must be designated for use by the pilot if they are to be used in computing vertical guidance.

a) Press the **FMS** Knob to activate the cursor.

b) Turn the large **FMS** Knob to place the cursor in the altitude field associated with the IAF at HABUK as in Figure 7-34.

ACTIVE FLIGHT PLAN
KMKC / KCOS
DTK DIS ALT
FSHER 352° 9.8NM -----FT
PYNON 352° 11.9NM -----FT
Approach - KCOS-RNAV 35RGPS LPV
HABUK iaf 021° 5.9NM 9000FT
FALUR 261° 5.0NM 8600FT
CEGIX faf 351° 6.0NM 7800FT
RW35R map 351° 5.1NM
6368FT 348° 0.4NM 6370FT
MOGAL mahp 10000FT
HOLD 168° 6.0NM
CURRENT VNV PROFILE
ACTIVE VNV WPT 10000FT at OPSHN -3NM
VS TGT -796FPM FPA -3.0°
VS REQ -----FPM TIME TO TOD 30:50
V DEV -----FT

Figure 7-34 Designate HABUK Altitude Constraint

c) Press the **ENT** Key. Note the altitude is now displayed as light blue text (Figure 7-35), indicating that the value is now be used to compute vertical guidance. The G1000 uses baro corrected altitude when giving vertical guidance to these waypoints.

d) Turn the large **FMS** Knob to select the altitude constraint associated with FALUR as seen in Figure 7-35.

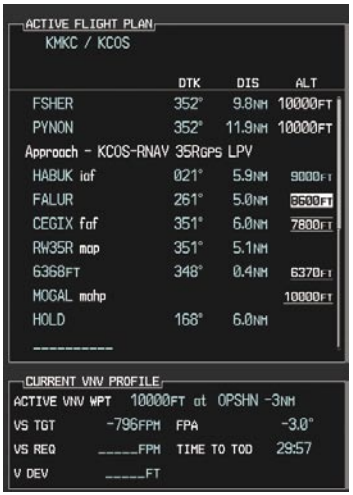

ACTIVE FLIGHT PLAN
KMKC / KCOS
DTK DIS ALT
FSHER 352° 9.8NM 10000FT
PYNON 352° 11.9NM 10000FT
Approach - KCOS-RNAV 35RGPS LPV
HABUK iaf 021° 5.9NM 9000FT
FALUR 261° 5.0NM 8600FT
CEGIX faf 351° 6.0NM 7800FT
RW35R map 351° 5.1NM
6368FT 348° 0.4NM 6370FT
MOGAL mahp 10000FT
HOLD 168° 6.0NM
CURRENT VNV PROFILE
ACTIVE VNV WPT 10000FT at OPSHN -3NM
VS TGT -796FPM FPA -3.0°
VS REQ _____FPM TIME TO TOD 29:57
V DEV _____FT

Figure 7-35 Designate FALUR Altitude Constraint

e) Press the **ENT** Key to designate this altitude constraint value for use in computing vertical guidance. This altitude value is now displayed as light blue text. Note that altitude values are now filled in for waypoints back to where the previous altitude value was entered for OPSHN.

Altitude constraint values associated with the Final Approach Fix (FAF) and waypoints beyond the FAF cannot be designated for vertical guidance. These altitude values are always displayed as white text, as in Figure 7-36. Vertical guidance from the FAF to the Missed Approach Point (MAP) is given using the WAAS GPS altitude source, therefore, the displayed altitude values are for reference only.

ACTIVE FLIGHT PLAN
KMKC / KCOS
DTK DIS ALT
FSHER 352° 9.8NM 10000FT
PYNON 352° 11.9NM 10000FT
Approach - KCOS-RNAV 35RGPS LPV
HABUK iaf 021° 5.9NM 9000FT
FALUR 261° 5.0NM 8600FT
CEGIX faf 351° 6.0NM 7800FT
RW35R map 351° 5.1NM
6368FT 348° 0.4NM 6370FT
MOGAL mahp 10000FT
HOLD 168° 6.0NM
CURRENT VNV PROFILE
ACTIVE VNV WPT 10000FT at OPSHN -3NM
VS TGT -796FPM FPA -3.0°
VS REQ _____FPM TIME TO TOD 29:49
V DEV _____FT

Figure 7-36 Vertical Guidance is Active to the FAF

14) As the aircraft approaches OPSHN, it may be desirable to adjust how fast, or steep, the upcoming descent will be. The default Flight Path Angle (FPA) is -3.0 degrees and a required vertical speed is computed to maintain the -3.0 FPA. To change the vertical flight path, perform the following steps.

a) Select the **VNV PROF** Softkey to place the cursor in the target vertical speed field (VS TGT) as shown in Figure 7-37.

b) At this point, the descent vertical speed can be selected, or the FPA can be selected. Turn the large **FMS** Knob to select the desired selection field, then turn the small **FMS** Knob to enter the desired value.

Note the information now displayed in the 'CURRENT VNV PROFILE' box. Also, note the offset waypoint and gray circle are now displayed on the map. The gray circle marks the Top of Descent (TOD). In this example, vertical guidance is provided at the TOD that results in a -3.0 degree FPA descent to an altitude of 10,000 feet upon reaching the offset waypoint.

Figure 7-37 Adjusting the Descent

c) Press the **ENT** Key.

15) As seen in Figure 7-38, the aircraft is approaching TOD. Note the target vertical speed required to reached the selected altitude. The Vertical Deviation Indicator (VDI) and the Required Vertical Speed Indicator (RVSI) are now displayed on the PFD as shown in Figure 7-39.

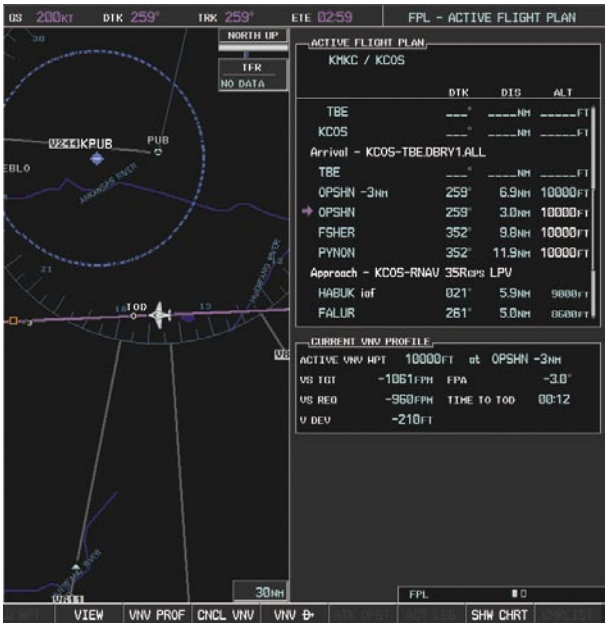


Figure 7-38 Approaching Top of Descent (TOD)

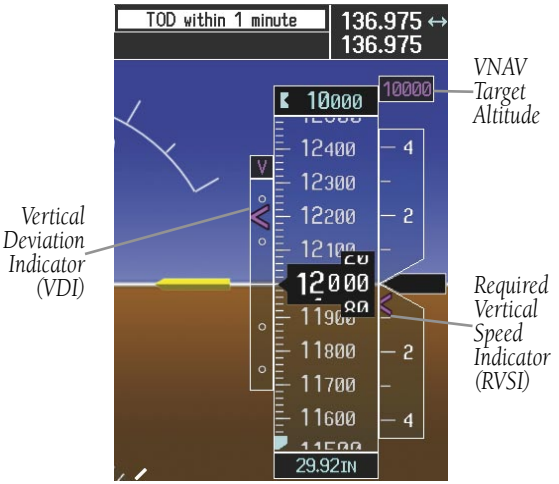


Figure 7-39 VDI & RVSI Upon Reaching Top of Descent (TOD)

16) Upon reaching TOD, a descent vertical speed is established which places the VSI pointer in line with the RVSI as shown in Figure 7-40.

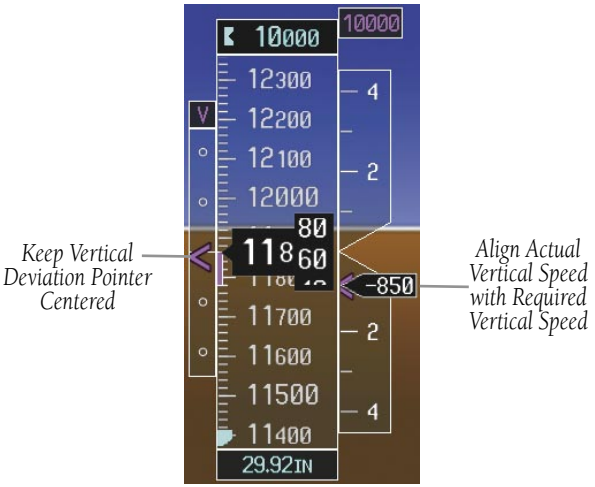


Figure 7-40 VDI & RVSI Showing Correctly Established Descent

17) When the aircraft is one minute from the bottom of descent (BOD) an annunciation is displayed as shown in Figure 7-41. Upon reaching the offset waypoint for OPSHN, the aircraft will be at 10,000 feet.

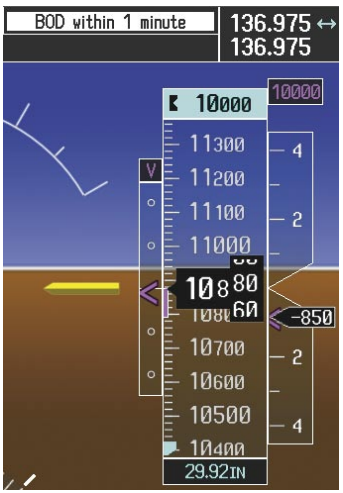


Figure 7-41 Approaching Bottom of Descent (BOD) at OPSHN Offset Waypoint

18) The aircraft is approaching OPSHN. The upcoming turn and next heading is annunciated at the top left of the PFD as seen in Figure 7-42. Initiate the turn and maneuver the aircraft on a track through the turn radius to intercept the magenta line for the OPSHN to FSHER leg and center the CDI.

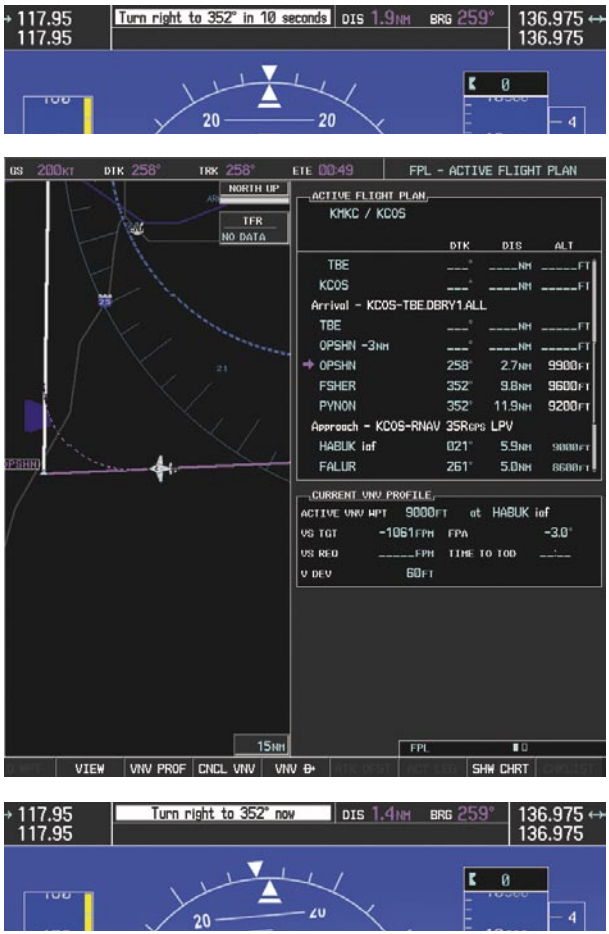


Figure 7-42 Turn to intercept OPSHN to FSHER Leg

19) After passing OPSHN, the next leg of the arrival turns magenta as shown in Figure 7-43. The magenta arrow in the flight plan list now indicates the OPSHN to FSHER leg of the arrival procedure is now active.

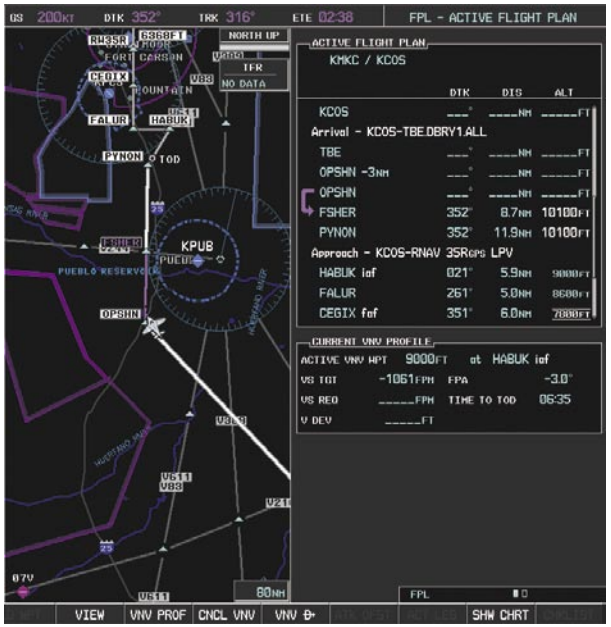


Figure 7-43 Tracking the OPSHN to FSHER Leg

20) The flight continues through the arrival procedure to PYNON (see Figure 7-44). At a point 31 nautical miles from the destination airport, the phase of flight scaling for the CDI changes to Terminal Mode and is annunciated by displaying 'TERM' on the HSI.

There will be a descent to HABUK in the next leg. Note the TOD point on the map. Annunciations for the upcoming turn and descent, as well as the VDI and RVSI, appear on the PFD as the flight progresses.

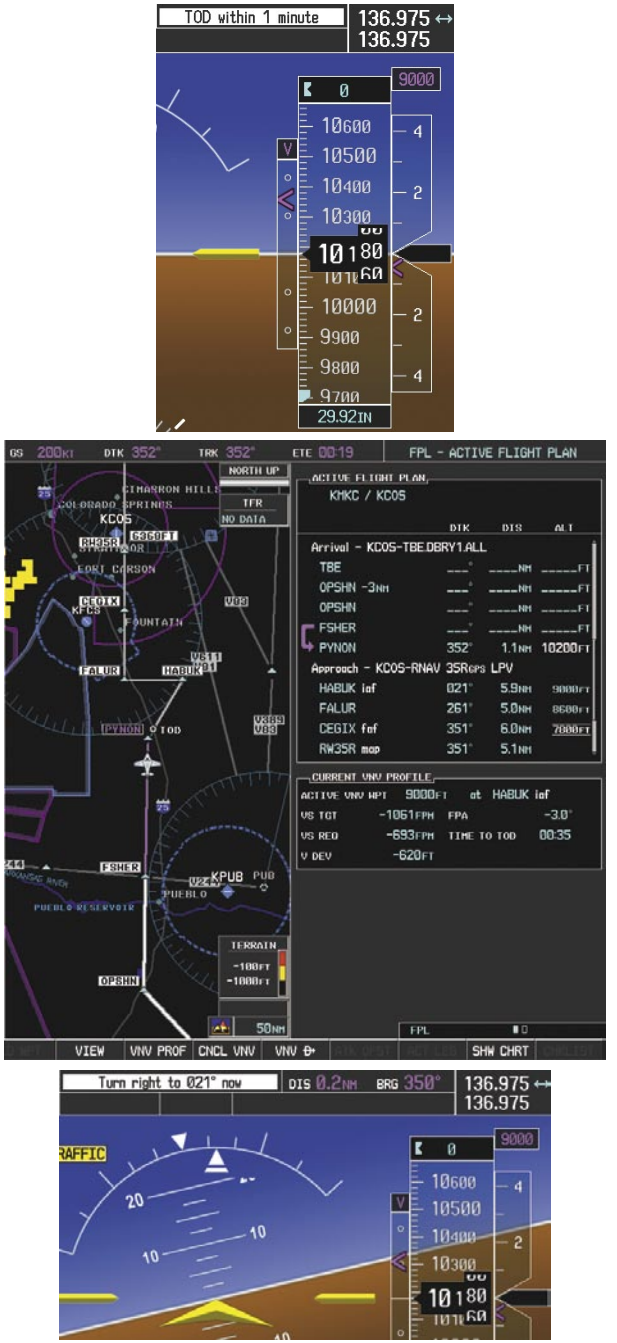


Figure 7-44 Approaching PYNON

21) Upon passing PYNON the approach procedure automatically becomes active. The approach may be activated at any point to proceed directly to the IAF. In this example, the aircraft has progressed through the final waypoint of the arrival and the flight plan has automatically sequenced to the IAF as the active leg, activating the approach procedure (see Figure 7-45).

Figure 7-45 Approach is Now Active

To manually activate the approach procedure, perform the following steps:

a) Press the **PROC** Key.

b) Turn the large **FMS** Knob to highlight 'ACTIVATE APPROACH' as shown in Figure 7-46.

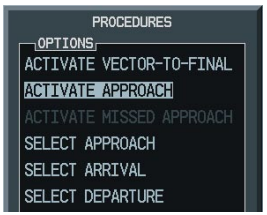


Figure 7-46 Manually Activate Approach

c) Press the **ENT** Key to activate the approach.

22) The IAF is the next waypoint. At the TOD, establish a descent vertical speed as previously discussed in Step 16. The aircraft altitude will be 9,000 feet upon reaching HABUK.

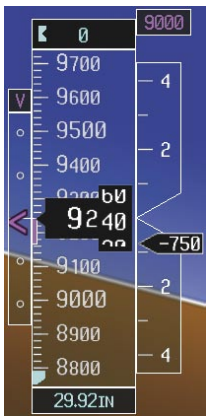


Figure 7-47 Descending Turn to the Initial Approach Fix (IAF)

23) After crossing FALUR the next waypoint is the FAF. The flight phase changes to LPV on the HSI indicating the current phase of flight is in Approach Mode and the approach type is LPV. CDI scaling changes accordingly and is used much like a localizer when flying an ILS approach. The RVSI is no longer displayed and the VDI changes to the Glidepath Indicator (as shown in Figure 7-48) when the final approach course becomes active.

Figure 7-48 Descending to the FAF

The descent continues through the FAF (CEGIX) using the Glidepath Indicator, as one would use a glideslope indicator, to obtain an altitude "AT" 7,800 feet at the FAF. Note the altitude restriction lines over and under (At) the altitude in the 'ALT' field in Figure 7-48.

24) After crossing CEGIX, the aircraft continues following the glidepath to maintain the descent to "AT or ABOVE" 6,370 feet at the Missed Approach Point (MAP) (RW35R) as seen in Figure 7-49.

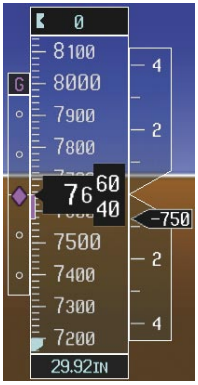


Figure 7-49 Descending to the Missed Approach Point

In this missed approach procedure, the fix immediately following the MAP (in this case '6368FT') is not part of the published procedure. It is simply a fix that defines a leg which guides the aircraft along the runway centerline until the required altitude to make the first turn on the missed approach is exceeded. In this case, if the aircraft altitude is below the specified altitude (6,368 feet) after crossing the MAP, a direct-to is established to this fix until an altitude of 6,368 feet reached. After reaching 6,368 feet, a direct-to is established to the published fix (in this case MOGAL). If the aircraft altitude is above the specified altitude after crossing the MAP, a direct-to is established to the published fix (MOGAL) to begin the missed approach procedure. The altitude constraint value defaults to 400 feet AGL when the fix is not part of the published procedure.

In some missed approach procedures this altitude fix may be part of the published procedure. For example, the procedure dictates a climb to 5,500 feet, then turn left and proceed to the Missed Approach Hold Point (MAHP). In this case, the altitude fix would be labeled '5500FT'. Again, if the aircraft altitude is lower than this prescribed altitude, a direct-to is established to this fix when the missed approach procedure is activated.

25) Upon reaching the MAP, it is decided to execute a missed approach. Automatic waypoint sequencing is suspended past the MAP. Select the **SUSP** Softkey on the PFD to resume automatic waypoint sequencing through the missed approach procedure.

A direct-to is initiated to MOGAL, which is the Missed Approach Hold Point (MAHP) as seen in Figure 7-50. The aircraft is climbing to 10,000 feet. The CDI flight phase now changes from LPV to MAPR as seen on the HSI.

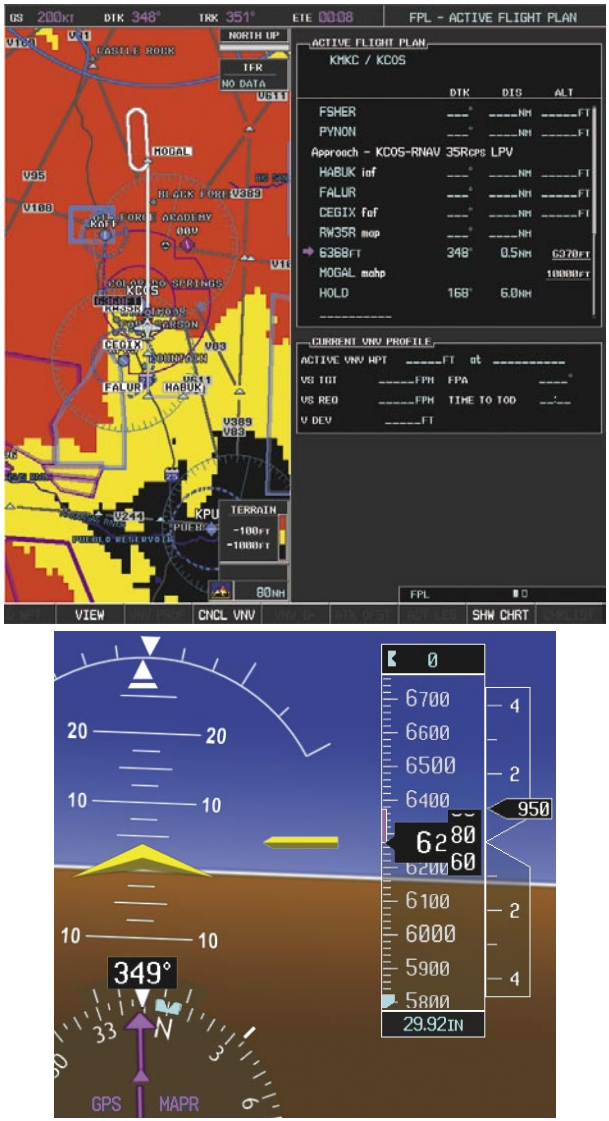


Figure 7-50 Missed Approach Active

26) The aircraft continues climbing to "AT or ABOVE" 10,000 feet at MOGAL. A holding pattern is established at the MAHP (MOGAL) as shown in Figure 7-51.

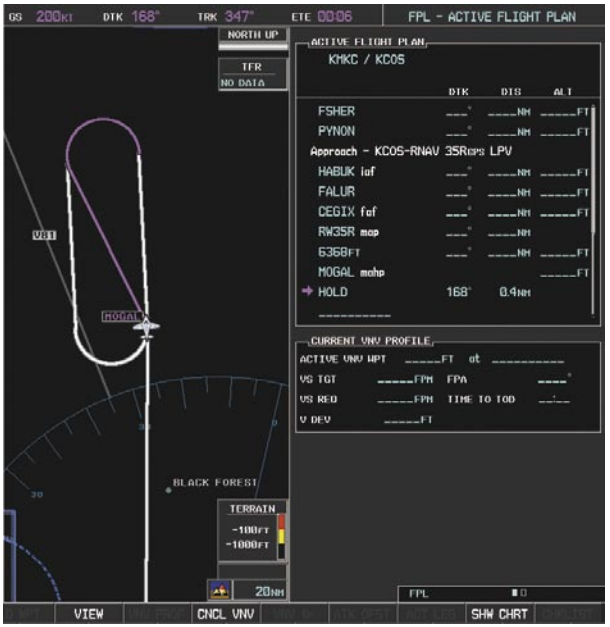


Figure 7-51 Establishing the Holding Pattern

27) The aircraft maintains 10,000 feet while following the magenta line through the hold as in Figure 7-52.

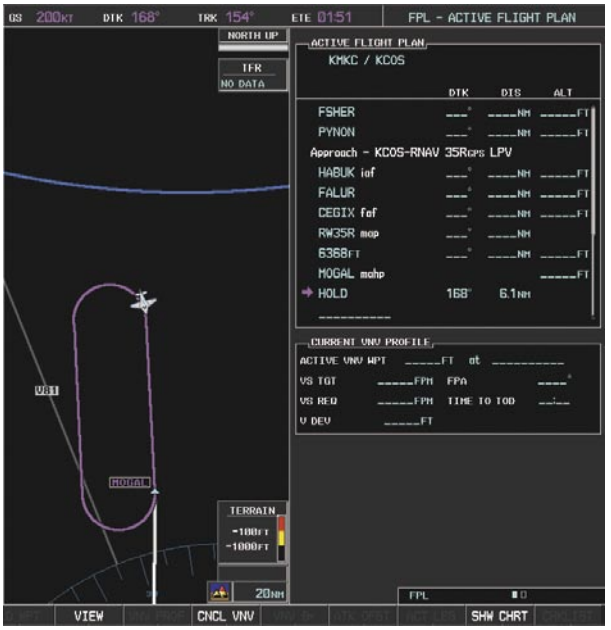


Figure 7-52 Hold Established

7.4 AIRPORT INFORMATION

Figure 7-53 Airport Information Page

Select the Airport Information Page

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the first rectangular page icon. Initially, information for the airport closest to the aircraft's present position is displayed.

Select an Airport from the Database

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Enter the desired airport identifier.

Select an Airport from the Active Flight Plan

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the small **FMS** Knob to the left to display a list of flight plan airports as shown in Figure 7-54.

Figure 7-54 Flight Plan Airport List

3) Turn the large **FMS** Knob to select the desired airport.
4) Press the **ENT** Key.

Select a Nearest Airport

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the small **FMS** Knob to the left. Initially, a flight plan airport list is displayed as in Figure 7-54. The list is populated only when navigating a flight plan.

Figure 7-55 Nearest Airport List

3) Turn the small **FMS** Knob to the right to display the 'NRST' airports to the aircraft's current position as shown in Figure 7-55.

4) Turn the large **FMS** Knob to select the desired airport.

5) Press the **ENT** Key.

Select a Recently Entered Airport Identifier

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 7-54. The list is populated only when navigating a flight plan.

3) Turn the small **FMS** Knob to the right to display the 'RECENT' airports as shown in Figure 7-56.

Figure 7-56 Recently Entered Airports List

4) Turn the large **FMS** Knob to select the desired airport.

5) Press the **ENT** Key.

Select an Airport by Facility Name or City Location

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the large **FMS** Knob to select the facility name or location (city) field.

3) Enter the desired facility name or city.

4) Press the **ENT** Key.

5) To remove the flashing cursor, press the **FMS** Knob.

Access Runway Information

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the large **FMS** Knob to place the cursor on the 'RUNWAYS' identifier field.

3) Turn the small **FMS** Knob in the direction of the green arrow to display the next runway for the selected airport. Continue turning the small **FMS** Knob to select the desired runway.

4) To remove the flashing cursor, press the **FMS** Knob.

Access Frequency Information

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the large **FMS** Knob to move the cursor to the Frequencies box.

3) Turn either **FMS** Knob to scroll through the list, placing the cursor on the desired frequency. If a listed frequency has sector or altitude restrictions, the frequency is preceded by an info ('i') designation. Press the **ENT** Key to view the information. The following may be displayed with the frequency:

- 'TX' – transmit only
- 'RX' – receive only
- 'PT' – part time frequency

4) Press the **ENT** Key to place the selected frequency in the standby field of the COM or NAV box.

5) To remove the cursor, press the **FMS** Knob.

7.5 INTERSECTION INFORMATION

Select the Intersection Information Page

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the second rectangular page icon.

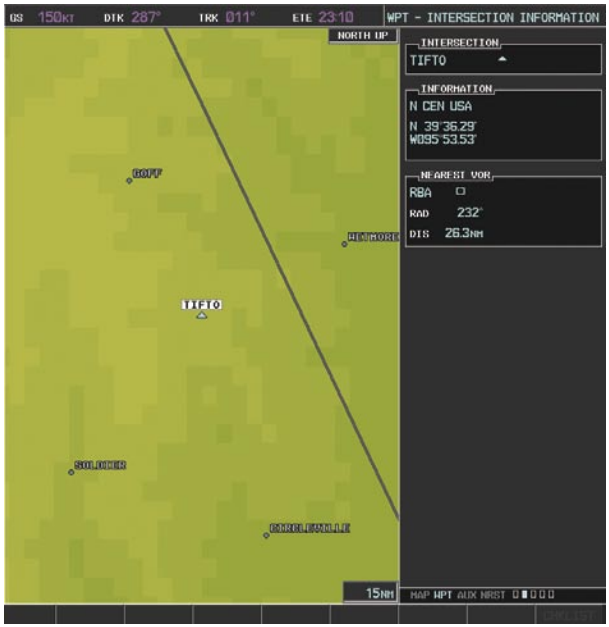


Figure 7-57 Intersection Information Page

Access Information on an Intersection

1) With the Intersection Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Enter an intersection identifier and press the **ENT** Key.
3) Press the **FMS** Knob to remove the flashing cursor.

7.6 NDB INFORMATION

Figure 7-58 NDB Information Page

Select the NDB Information Page

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the third rectangular page icon

View Information on a Specific NDB

1) With the NDB Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to highlight the desired selection field (identifier, name or closest city).
3) Enter an identifier, name or city and press the **ENT** Key. If there are duplicate identifiers in the database, a list is displayed from which to choose the desired location.
4) Press the **FMS** Knob to remove the flashing cursor.

7.7 VOR INFORMATION

Figure 7-59 VOR Information Page

Select the VOR Information Page

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the fourth rectangular page icon.

Access Information on a VOR

1) With the VOR Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to highlight the desired selection field (identifier, name or closest city).
3) Enter an identifier, name or city and press the **ENT** Key.
4) The 'FREQUENCY' field is now highlighted. If desired, press the **ENT** Key to place the frequency in the NAV receiver standby field.
5) Press the **FMS** Knob to remove the flashing cursor.

7.8 USER WAYPOINT INFORMATION PAGE

See the Flight Planning section for a discussion on creating and modifying user defined waypoints.

7.9 NEAREST AIRPORTS

Figure 7-60 Nearest Airports Page

Nearest Airport Information on the MFD

Select the Nearest Airports Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.
2) Turn the small **FMS** Knob to select the first rectangular page icon.

   Initially, the closest airport to the aircraft's present position is displayed.

Access Information on a Specific Airport

1) With the Nearest Airports Page displayed, select the **APT** Softkey to place the cursor in the 'NEAREST AIRPORTS' field. The first airport in the nearest airports list is highlighted.
2) Press the **FMS** Knob, then turn the large **FMS** Knob to highlight the desired airport.
3) Press the **FMS** Knob to remove the flashing cursor.

Access Runway Information for the Selected Airport

1) With the Nearest Airports Page displayed, select the **RNWY** Softkey to place the cursor in the 'RUNWAYS' field.
2) Turn the small **FMS** Knob to select the desired runway.
3) Press the **FMS** Knob to remove the flashing cursor.

Quickly Tune the COM Transceiver to a Nearby Airport Frequency

1) With the Nearest Airports Page displayed, select the **FREQ** Softkey to place the cursor in the 'FREQUENCIES' field.
2) Turn either **FMS** Knob to select the desired frequency.
3) Press the **ENT** Key. The selected frequency is placed in the COM standby frequency field.
4) Press the **Frequency Transfer** Key to place the frequency in the active field.
5) Press the **FMS** Knob to remove the flashing cursor.

Nearest Airports Information on the PFD

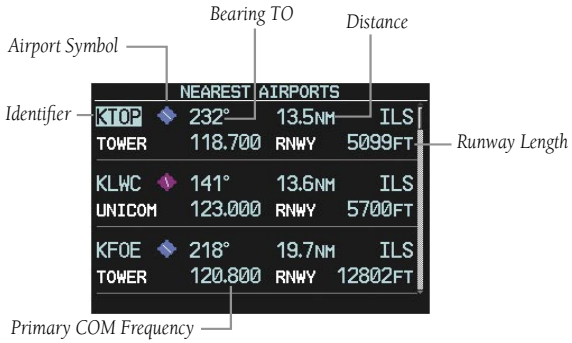


Figure 7-61 Nearest Airports Window

Select the **NRST** Softkey to display the PFD Nearest Airports Window.

View Information on a Specific Airport in the List

1) With the Nearest Airports Window displayed, turn either **FMS** Knob to place the cursor on the desired airport identifier.
2) Press the **ENT** Key to display airport information.
3) Press the **ENT** Key again (cursor is on 'BACK') to return to the list.

Load an Airport COM Frequency into the Active COM

1) With the Nearest Airports Window displayed, turn either **FMS** Knob to place the cursor on the desired airport frequency shown in the window.
2) Press the **ENT** Key and the selected frequency is placed in the COM standby frequency field.
3) Press the **Frequency Transfer** Key to make the frequency the active frequency.

7.10 NEAREST INTERSECTIONS

Figure 7-62 Nearest Intersections Page

Select the Nearest Intersections Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.
2) Turn the small **FMS** Knob to select the second rectangular page icon.

View Information on the Nearest Intersection

1) With the Nearest Intersections Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn either **FMS** Knob to select the desired intersection.
3) Press the **FMS** Knob to remove the flashing cursor.

7.11 NEAREST NDB

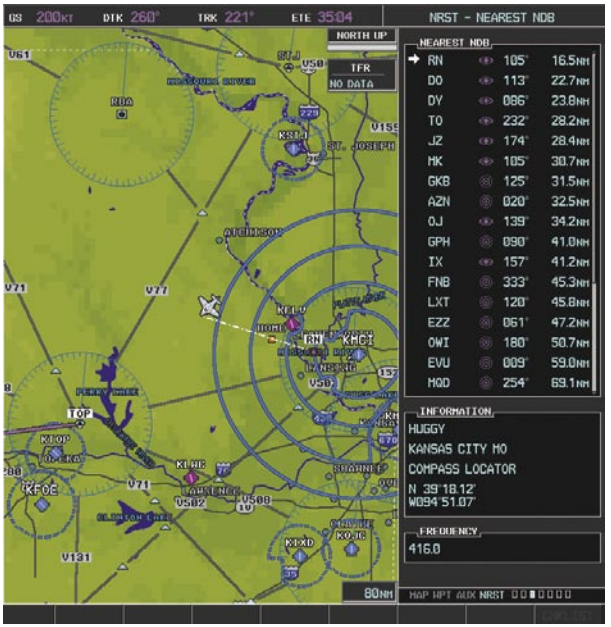


Figure 7-63 Nearest NDB Page

Select the Nearest NDB Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.
2) Turn the small **FMS** Knob to select the third rectangular page icon.

Access Information on a Specific NDB

1) With the Nearest NDB Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn either **FMS** Knob to select the desired NDB. The remaining information on the Nearest NDB Page pertains to the selected NDB.
3) Press the **FMS** Knob to remove the flashing cursor.

7.12 NEAREST VOR

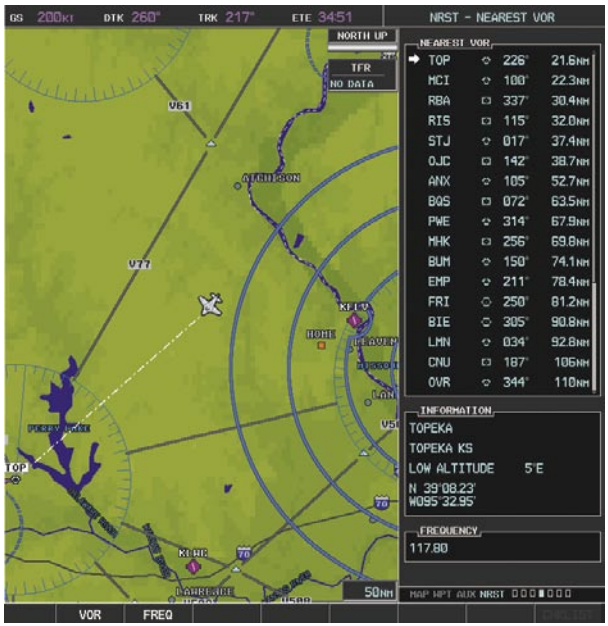


Figure 7-64 Nearest VOR Page

Select the Nearest VOR Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.
2) Turn the small **FMS** Knob to select the fourth rectangular page icon.

View Information on the Nearest VOR

1) With the Nearest VOR Page displayed, select the **VOR** Softkey to place the cursor in the 'NEAREST VOR' box.
2) Turn either **FMS** Knob to select a VOR.
3) Press the **FMS** Knob to remove the flashing cursor.

Select and Load a VOR Frequency

1) With the Nearest VOR Page displayed, select the **FREQ** Softkey to highlight the VOR frequency in the 'FREQUENCY' field.
2) Press the **ENT** Key. The selected VOR frequency is placed in the NAV standby frequency field.
3) Press the **FMS** Knob to remove the flashing cursor.

7.13 NEAREST USER WAYPOINT

Figure 7-65 Nearest User Waypoints Page

Select the Nearest User Waypoint Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.
2) Turn the small **FMS** Knob to select the fifth rectangular page icon.

Select a Nearest User Waypoint

1) With the Nearest User Waypoint Page displayed, press the **FMS** Knob to activate the cursor. If any previously entered User Waypoints are within 200 nm, these are displayed with the closest listed first.

2) Turn either **FMS** Knob to select the desired waypoint. The remaining information on the Nearest User Waypoint Page pertains to the selected Nearest User Waypoint.

3) Press the **FMS** Knob to remove the flashing cursor.

7.14 NEAREST FREQUENCIES

Figure 7-66 Nearest Frequencies Page

Select the Nearest Frequencies Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.

2) Turn the small **FMS** Knob to select the sixth rectangular page icon.

Select and Load the Nearest ARTCC, FSS, or Weather Frequency

1) With the Nearest Frequencies Page displayed, select the **ARTCC, FSS,** or **WX** Softkey to place the cursor in the appropriate field.

2) Turn the **FMS** Knobs to select the desired facility or frequency.

3) Press the **ENT** Key to load the frequency into the COM frequency standby field.

4) Press the **FMS** Knob to remove the flashing cursor.

7.15 NEAREST AIRSPACES

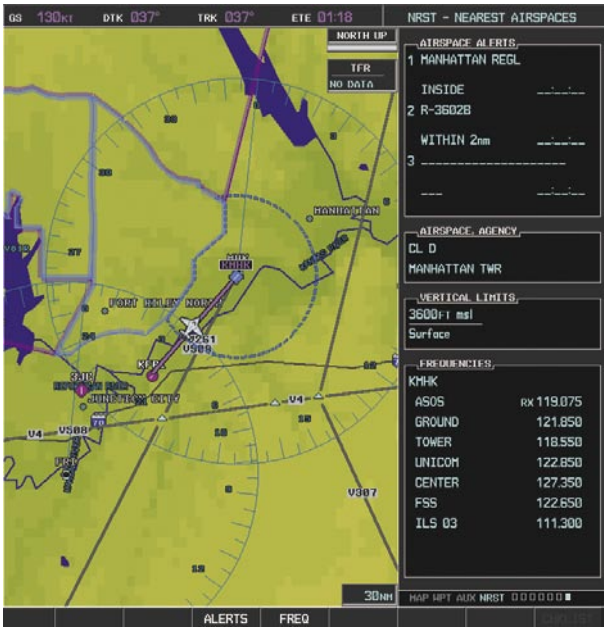


Figure 7-67 Nearest Airspaces Page

Select the Nearest Airspaces Page

1) Turn the large **FMS** Knob to select the 'NRST' page group.

2) Turn the small **FMS** Knob to select the seventh rectangular page icon.

Airspace Alerts Box

- If the projected course takes the aircraft inside an airspace within the next ten minutes, 'Ahead' is displayed.
- If the aircraft is within two nautical miles of an

airspace and the current course takes the aircraft inside, 'Ahead < 2 nm' is displayed.

- If the aircraft is within two nautical miles of an airspace and the current course will not take the aircraft inside, 'Within 2 nm' is displayed.
- If the aircraft has entered an airspace, 'Inside' is displayed.

View Additional Details for a Listed Airspace

1) With the Nearest Airspace Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn either **FMS** Knob to scroll through the list, highlighting the desired airspace.
3) Select the **ALERTS** Softkey to place the cursor in the 'AIRSPACE ALERTS' field.
4) Turn either **FMS** Knob to select the desired airspace.
5) Press the **FMS** Knob to remove the flashing cursor.

View and Quickly Load the Frequency for a Controlling Agency

1) With the Nearest Airspace Page displayed, select the **FREQ** Softkey to place the cursor in 'FREQUENCIES' field.
2) Turn either **FMS** Knob to select the desired frequency.
3) Press the **ENT** Key to load the frequency into the COM frequency standby field.
4) Press the **FMS** Knob to remove the flashing cursor.

Blank Page

SECTION 8: FLIGHT PLANNING

The following discussions pertain to the Multi Function Display, unless otherwise indicated.

8.1 USER DEFINED WAYPOINTS

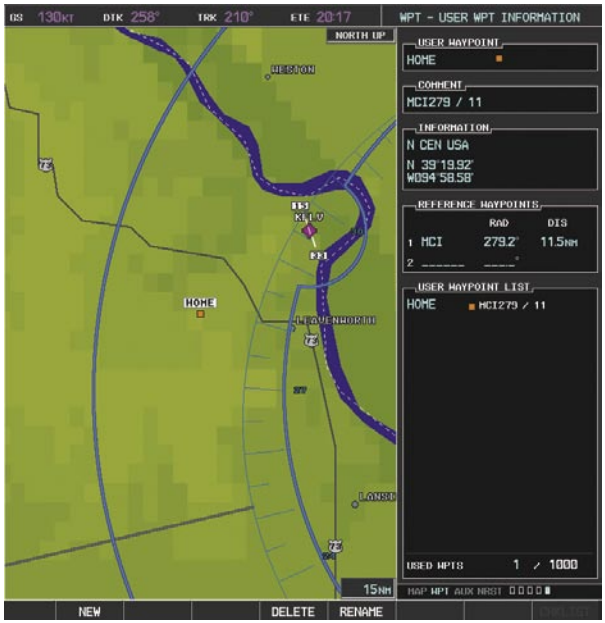


Figure 8-1 User WPT Information Page

Select the User WPT Information Page

1) Turn the large **FMS** Knob to select the 'WPT' page group.
2) Turn the small **FMS** Knob to select the fifth rectangular page icon.

Create a New User Waypoint

1) With the User Waypoint Information Page displayed, select the **NEW** Softkey. A waypoint is created at the current aircraft position.
2) Turn the small **FMS** Knob to enter first character of the waypoint name.
3) Turn the large **FMS** Knob to move the cursor to the next character field.
4) Repeat steps 2 and 3 until the desired name is entered.
5) Press the **ENT** Key.
6) The cursor is now in the 'REFERENCE WAYPOINTS' field. If desired, the waypoint can be defined by a reference waypoint. Turn the **FMS** Knobs to enter the position coordinates or the radial and distance from the reference waypoint.
7) Press the **FMS** Knob to remove the flashing cursor.

Modify a User Waypoint

1) With the User Waypoint Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to move the cursor to the desired field and turn the small **FMS** Knob to make changes.
3) Press the **ENT** Key to accept the changes.
4) Press the **FMS** Knob to remove the flashing cursor.

Delete a User Waypoint

1) Select the User Waypoint Information Page and press **MENU** to display the User Waypoint Information Page Options or select the **DELETE** Softkey.
2) Turn the large **FMS** Knob to select 'Delete User Waypoint' and press the **ENT** Key. The message 'Would you like to delete the user waypoint' is displayed. With 'YES' highlighted, press the **ENT** Key.

Create User Waypoints from the Navigation Map Page

1) With the Navigation Map Page displayed, push the **Joystick** to activate the panning function. The target pointer is displayed at the present aircraft position.
2) Move the **Joystick** to place the pointer at the desired position
3) Press the **ENT** Key. The User Waypoint Information Page is now displayed with the captured position.
4) Turn the **FMS** Knobs to select a waypoint name.
5) Press the **ENT** Key to accept the selected name. The first reference waypoint field is highlighted.
6) If desired, turn the **FMS** Knobs to enter the identifier of the reference waypoint and the radial and distance to the reference waypoint. Press the **ENT** Key to accept.
7) Press the **FMS** Knob to remove the flashing cursor or select the **GO BACK** Softkey to return to the map.

8.2 VIEWING THE ACTIVE FLIGHT PLAN

Press the **FPL** Key.

Figure 8-2 Active Flight Plan Window on the PFD

Figure 8-3 Active Flight Plan Page on the MFD

8.3 ACTIVATE A STORED FLIGHT PLAN

1) Press the **FPL** Key and turn the small **FMS** Knob to display the Flight Plan Catalog Page.

Figure 8-4 Flight Plan Catalog Page

2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the desired flight plan and select the **ACTIVE** Softkey.
4) With 'OK' highlighted, press the **ENT** Key to activate the flight plan. To cancel the flight plan activation,

turn the large **FMS** Knob to highlight 'CANCEL' and press the **ENT** Key.

8.4 ACTIVATE A FLIGHT PLAN LEG

1) From the Active Flight Plan Page, press the **FMS** Knob to activate the cursor and turn the large **FMS** Knob to highlight the desired destination waypoint.
2) Select the **ACT LEG** Softkey (using MFD only).

   Or:

   Press the **MENU** Key, select the 'Activate Leg' option from the page menu and press the **ENT** Key. This step must be used when activating a leg from the PFD.
4) With 'Activate' highlighted, press the **ENT** Key.

Figure 8-5 Activate Flight Plan Leg Confirmation

8.5 STOP NAVIGATING A FLIGHT PLAN

1) Press the **FPL** Key to display the Active Flight Plan Page.
2) Press the **MENU** Key to display the Page Menu window.

Figure 8-6 Delete Flight Plan

3) Turn the large **FMS** Knob to highlight 'Delete Flight Plan' and press the **ENT** Key. With 'OK' highlighted, press the **ENT** Key to deactivate the flight plan. This will not delete the stored flight plan, only the active flight plan.

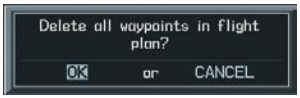


Figure 8-7 Delete Flight Plan Confirmation

8.6 INVERT ACTIVE FLIGHT PLAN

1) From the Active Flight Plan Page, press the **MENU** Key to display the Page Menu.
2) Turn the large **FMS** Knob to highlight 'Invert Flight Plan' and press the **ENT** Key. The original flight plan remains intact in its flight plan catalog storage location.
3) With 'OK' highlighted, press the **ENT** Key to invert the flight plan.

Figure 8-8 Invert Flight Plan

Figure 8-9 Invert Flight Plan Confirmation

8.7 CREATE A NEW FLIGHT PLAN

Create a New Flight Plan Using the MFD

1) Press the **FPL** Key and turn the small **FMS** Knob to display the Flight Plan Catalog Page.
2) Select the **NEW** Softkey to display a blank flight plan page for the first empty storage location.

Figure 8-10 Create FPL on MFD

3) Turn the small **FMS** Knob to display the Waypoint Information Window.
4) Turn the small **FMS** Knob to the right enter the first character of the identifier of the departure airport. Turning the knob to the left accesses the FPL, NRST, and RECENT waypoint list.
5) Turn the large **FMS** Knob to move the cursor to the next character field. Repeat steps 4 and 5 until the desired identifier has been entered.

Figure 8-11 Waypoint Info Window

6) Press the **ENT** Key.
7) Repeat step number 3, 4, and 5 to enter the identifier for each additional flight plan waypoint.
8) When all waypoints have been entered, press the **FMS** Knob to return to the Flight Plan Catalog Page. The new flight plan is now in the list.

Create a New Flight Plan Using the PFD

NOTE: *A flight plan cannot be entered using the PFD if another flight plan is active.*

NOTE: *After the first leg is entered (using the PFD only), it is immediately activated.*

1) Press the **FPL** Key, then press the **FMS** Knob to activate the cursor.
2) Turn the small **FMS** Knob to enter the first letter of the destination airport identifier. Turn the large **FMS** Knob to the right to move the cursor to the next character position.
3) Repeat step 2 to spell out the rest of the waypoint identifier.
4) Press the **ENT** Key and the cursor is now ready for entering of the next flight plan waypoint.
5) Repeat steps 2 through 4 to enter the identifier for each additional flight plan waypoint.
6) Once all waypoints have been entered, press the **FMS** Knob remove the cursor. The new flight plan is now active.

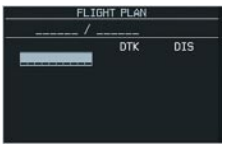


Figure 8-12 Creating Flight Plan on the PFD

8.8 ENTER AN AIRWAY IN A FLIGHT PLAN

1) Press the **FPL** Key to display the active flight plan or display a stored flight plan.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the waypoint before which the airway will be entered.

Figure 8-13 Airway Insertion Point

4) Turn the small **FMS** Knob to display the Waypoint Information Window and begin entering the desired airways entry point.

Figure 8-14 Load Airway Entry Point

5) When the desired entry point is entered, press the **ENT** Key.

Figure 8-15 Airway Entry Point Loaded

6) Turn the small **FMS** Knob to display the Waypoint Information Window.

Figure 8-16 Enter Airway Identifier

7) Select the **LD AIRWY** Softkey. A list of available airways is now displayed.

Figure 8-17 Select Desired Airway

8) Turn either **FMS** Knob to highlight the desired airway.

9) Press the **ENT** Key. A list of available exits is now displayed.

10) Turn either **FMS** Knob to highlight the desired exit point.

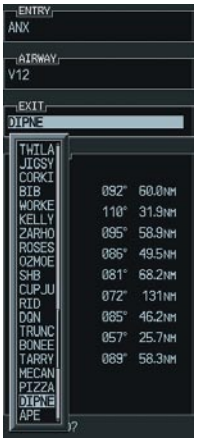


Figure 8-18 Select Desired Exit Point

11) With the desired exit point highlighted, press the **ENT** Key.

12) With 'LOAD?' highlighted, press the **ENT** Key.

Figure 8-19 Airway Added to Flight Plan

8.9 LOAD A DEPARTURE

See the Procedures section for a discussion on loading and activating departure procedures.

8.10 LOAD AN ARRIVAL

See the Procedures section for a discussion on loading and activating arrival procedures.

8.11 LOAD AN APPROACH

See the Procedures section for a discussion on loading and activating approach procedures.

8.12 REMOVE A DEPARTURE, ARRIVAL, APPROACH, OR AIRWAY FROM A FLIGHT PLAN

1) With the Active or Stored Flight Plan Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the large **FMS** Knob to highlight the title for the approach, departure, arrival, or airway to be deleted. Titles appear in white directly above the procedure's waypoints.

3) Press the **CLR** Key to display a confirmation window. With 'OK' highlighted, press the **ENT** Key to remove the selected procedure or airway.

8.13 STORE A FLIGHT PLAN

1) After creating a flight plan on either the PFD or MFD, it may be saved by pressing the **MENU** Key.
2) Turn the large **FMS** Knob to highlight 'Store Flight Plan' and press the **ENT** Key.
3) With 'OK' highlighted, press the **ENT** Key to store the flight plan.

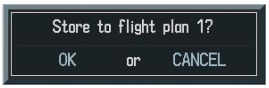


Figure 8-20 Store Flight Plan Confirmation

8.14 EDIT A STORED FLIGHT PLAN

1) Press the **FPL** Key and turn the small **FMS** Knob to display the Flight Plan Catalog Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the desired flight plan and select the **EDIT** Softkey.
4) Turn the large **FMS** Knob to place the cursor in the desired locations for entering changes.
5) Turn the **FMS** Knobs to make the desired changes, then press the **ENT** Key.
6) Press the **FMS** Knob to return to the Flight Plan Catalog Page.

8.15 DELETE A WAYPOINT FROM THE FLIGHT PLAN

1) With either the Active or Stored Flight Plan displayed, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to select the waypoint to be deleted.
3) Press the **CLR** Key to display a 'REMOVE (Wpt Name)' confirmation window.

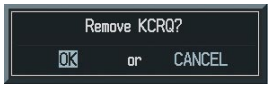


Figure 8-21 Remove Waypoint Confirmation

4) With 'OK' highlighted, press the **ENT** Key to remove the waypoint. To cancel the delete request, turn the large **FMS** Knob to highlight 'CANCEL' and press the **ENT** Key.
5) Once all changes have been made, press the **FMS** Knob to remove the cursor.

8.16 INVERT AND ACTIVATE A STORED FLIGHT PLAN

1) From the Flight Plan Catalog Page, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to highlight the desired flight plan.
3) Select the **INVERT** Softkey. 'Invert and activate stored flight plan?' is displayed.
4) With 'OK' highlighted, press the **ENT** Key. The selected flight plan is now inverted and activated. The original flight plan remains intact in its flight plan catalog storage location.

8.17 COPY A FLIGHT PLAN

1) From the Flight Plan Catalog press the **FMS** Knob to activate the cursor
2) Turn the large **FMS** Knob to highlight the flight plan to be copied.
3) Select the **COPY** Softkey.

4) A 'Copy to flight plan #?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** Key to copy the flight plan. To cancel, turn the large **FMS** Knob to highlight 'CANCEL' and press the **ENT** Key.

8.18 DELETE A FLIGHT PLAN

1) From the Flight Plan Catalog Page, press the **FMS** Knob to activate the cursor.
2) Turn the large **FMS** Knob to highlight the flight plan to be deleted.
3) Select the **DELETE** Softkey.
4) A 'Delete flight plan #?' confirmation window is displayed. With 'OK' highlighted, press the **ENT** Key to delete the flight plan. To cancel, turn the large **FMS** Knob to highlight 'CANCEL' and press the **ENT** Key.

8.19 GRAPHICAL FLIGHT PLAN CREATION

1) Press the **FPL** Key to display the Active Flight Plan Page.
2) Press the **Joystick** to activate the map pointer. Use the **Joystick** to move the pointer to the desired point on the map to be inserted as a waypoint in the flight plan.
3) Select the **LD WPT** Softkey. The selected waypoint is inserted at the end of the flight plan. The default user waypoint naming is USR000, USR001, USR002 and so on.
4) If the selected waypoint is to be placed elsewhere in the flight plan, press the **FMS** Knob to activate the cursor. Waypoints are inserted *ABOVE* the cursor.
5) After placing the cursor at the desired point in the list of waypoints, select the **LD WPT** Softkey.
6) To change the user waypoint name, follow the procedure for modifying a user waypoint.

8.20 WEIGHT PLANNING

NOTE: *All weight planning page data fields displays data rounded to the nearest 10 pounds or 5 kilograms.*

Figure 8-22 Weight Planning Page

Enter Basic Empty Weight

1) Select the **EMPTY WT** Softkey; or press the **MENU** Key, highlight 'Set Basic Empty Weight', and press the **ENT** Key to select the BASIC EMPTY WEIGHT field.
2) Turn the small **FMS** Knob to enter the basic empty weight.
3) Press the **ENT** Key to confirm the entry.

Enter a Pilot and Stores Weight

1) Press the **FMS** Knob to activate the cursor and highlight the 'PILOT AND STORES' field.
2) Turn the small **FMS** Knob to enter the pilot and stores weight.
3) Press the **ENT** Key to confirm the entry.

The basic operating weight is calculated by adding the basic empty weight and the pilot and stores weight.

Enter Number of Passengers

1) Press the **FMS** Knob to activate the cursor and highlight the 'PASSENGERS #' field.
2) Turn the small **FMS** Knob to enter the number of passengers.
3) Press the **ENT** Key to confirm the entry.

Enter Average Passenger Weight

1) Press the **FMS** Knob to activate the cursor and highlight the passenger weight field.
2) Turn the small **FMS** Knob to enter the average passenger weight.
3) Press the **ENT** Key to confirm the entry.

The total weight of passengers is calculated by multiplying the number of passengers by the average passenger weight.

Enter Cargo Weight

1) Press the **FMS** Knob to activate the cursor and highlight the 'CARGO' field.
2) Turn the small **FMS** Knob to enter the cargo weight.
3) Press the **ENT** Key to confirm the entry.

The 'ZERO FUEL WEIGHT' is calculated by adding the basic empty, pilot and stores, passenger, and cargo weights.

Enter Fuel on Board Weight:

1) Press the **FMS** Knob to activate the cursor and highlight the 'FUEL ON BOARD' field.
2) Turn the small **FMS** Knob to enter the fuel on board.
3) Press the **ENT** Key to confirm the entry.

Synchronizing Fuel on Board with Actual Measured Fuel on Board

Select the **FOB SYNC** Softkey; or press the **MENU** Key, highlight 'Synchronize Fuel on Board', and press the **ENT** Key. The actual measured fuel on board is displayed in the fuel on board field.

When the aircraft is in the air and a destination waypoint has been entered, the fuel calculations can be completed.

- Estimated landing weight = zero fuel weight + estimated landing fuel weight.
- Estimated landing fuel weight = fuel on board weight - (fuel flow x ETE)
- Excess fuel weight = estimated landing fuel weight - fuel reserves weight

If the aircraft is on the ground or a destination waypoint has not been entered, the following fields display invalid values consisting of six dashes:

- Estimated landing weight
- Estimated landing fuel weight
- Excess fuel weight

Weight Caution And Warning Conditions

If the zero fuel weight is greater than the maximum allowable zero fuel weight, then the zero fuel weight is displayed in amber.

If the aircraft weight is greater than the maximum allowable takeoff weight, then the aircraft weight is displayed in amber.

If the estimated landing weight is greater than the maximum allowable landing weight, then the estimated landing weight is displayed in amber.

If the estimated landing fuel weight is positive, but less than or equal to the fuel reserves weight, the following values are displayed in amber:

- Estimated fuel at landing weight
- Excess fuel weight

If the estimated landing fuel weight is zero or negative, then the following values are displayed in red:

- Estimated fuel at landing weight
- Excess fuel weight

8.21 TRIP PLANNING

1) Turn the large **FMS** Knob to select the 'AUX' page group.
2) Turn the small **FMS** Knob to select the first rectangular page icon.
3) The current page mode is displayed at the top of the page: 'AUTOMATIC' or 'MANUAL'. To change the page mode, select the **AUTO** or **MANUAL** Softkey.

Figure 8-23 Trip Planning Page

4) For Direct-to planning, select the **WPTS** Softkey and verify that the starting waypoint field indicates 'P.POS' (present position). If necessary, press the **MENU** Key and select 'Set WPT to Present Position' to display 'P.POS'. Press the **ENT** Key and the flashing cursor moves to the ending waypoint field. Turn the **FMS** Knobs to enter the identifier of the ending waypoint and press the **ENT** Key to accept the waypoint.

Or:

For point-to-point planning, turn the **FMS** Knobs to enter the identifier of the starting waypoint. Once the waypoints identifier is entered, press the **ENT** Key to accept the waypoint. The flashing cursor moves to the ending waypoint. Again, turn the **FMS** Knobs to enter the identifier of the ending waypoint and press the **ENT** Key to accept the waypoint.

Or:

For flight plan leg planning, select the **FPL** Softkey (at the bottom of the display) and turn the small **FMS** Knob to select the desired flight plan (already stored in memory), by number. Turn the large **FMS** Knob to highlight the 'LEG' field and turn the small **FMS** Knob to select the desired leg of the flight plan, or select 'CUM' to apply trip planning calculations to the entire flight plan. Selecting 'FPL 00' displays the active flight plan. If an active flight plan is selected, 'REM' is an available option to display planning data for the remainder of the flight plan.

NOTE: *The Page Mode must be set to MANUAL to perform the following steps.*

5) Turn the large **FMS** Knob to highlight the departure time (DEP TIME) field.

NOTE: *The departure time on the Trip Planning Page is used for preflight planning. Refer to the Utility Page for the actual flight departure time.*

6) Turn the **FMS** Knobs to enter the departure time. Press the **ENT** Key when finished. (Departure time may be entered in local or UTC time, depending upon system settings).

7) Turn the **FMS** Knobs to enter the fuel flow. Press the **ENT** Key when finished. Note that in automatic page mode, fuel flow is provided by the system.

8) The flashing cursor moves to the fuel on board field. Turn the **FMS** Knobs to modify the fuel on board. Press the **ENT** Key when finished.

9) The flashing cursor moves to the calibrated airspeed field. Turn the **FMS** Knobs to enter a calibrated airspeed. Press the **ENT** Key when finished.

Blank Page

SECTION 9: PROCEDURES

9.1 ARRIVALS AND DEPARTURES

Load and Activate a Departure Procedure

1) Press the **PROC** Key.
2) Turn the large **FMS** Knob to hightlight 'SELECT DEPARTURE'.
3) Press the **ENT** Key.
4) If a flight plan is active, the departure airport is displayed as the default. A list of available departures is also displayed. If no flight plan is active, use the **FMS** Knobs to enter the identifier of the desired airport. Press the **ENT** Key.
5) Turn the large **FMS** Knob to highlight the Departure field. Turn the small **FMS** Knob to display a list of available departures.
6) Turn either **FMS** Knob to select the desired departure and press the **ENT** Key.

Figure 9-1 Select Departure

7) A list of runways may be displayed for the departure. Turn either **FMS** Knob to select the desired runway and press the **ENT** Key.
8) A list of available transitions is displayed for the departure. Turn either **FMS** Knob to highlight the desired transition waypoint and press the **ENT** Key.

Figure 9-2 Select Departure Transition

9) With 'LOAD?' highlighted, press the **ENT** Key. The departure is active when the flight plan is active.

Load and Activate An Arrival Procedure

1) Press the **PROC** Key.
2) Turn the large **FMS** Knob to hightlight 'SELECT ARRIVAL'.
3) Press the **ENT** Key.
4) If a flight plan is active, the destination airport is displayed as the default. A list of available arrivals is also displayed. If no flight plan is active, use the **FMS** Knobs to enter the identifier of the desired airport. Press the **ENT** Key.
5) Turn the large **FMS** Knob to highlight the Arrival field. Turn the small **FMS** Knob to display a list of available arrivals.
6) Turn either **FMS** Knob to select the desired arrival and press the **ENT** Key.

Figure 9-3 Select Arrival

7) A second window is displayed listing available transitions for the arrival. Turn either **FMS** Knob to highlight the desired transition waypoint and press the **ENT** Key.

Figure 9-4 Select Arrival Transition

8) A third window is displayed listing the available runways. Turn either **FMS** Knob to select the desired runway and press the **ENT** Key.

Figure 9-5 Select Arrival Runway

9) With 'LOAD?' highlighted, press the **ENT** Key. If a flight plan is active, the selected arrival procedure is inserted after the destination airport and becomes part of the active flight plan. To begin flying the arrival procedure, initiate a Direct-to at the desired arrival waypoint in the flight plan. If no flight plan is active when the arrival is loaded, the arrival procedure becomes the active flight plan.

9.2 APPROACHES

NOTE: *If certain GPS parameters (WAAS, RAIM, etc.) are not available, some published approach procedures for the desired airport may not be displayed in the list of available approaches.*

Not all approaches in the database are approved for GPS use. When selecting an approach, a "GPS" designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver. Some procedures do not have this designation, meaning the GPS receiver can be used for supplemental navigation guidance only. If the GPS receiver cannot be used for primary guidance, the appropriate navigation receiver must be used for the selected approach (e.g., VOR or ILS). The final course segment of ILS approaches, for example, must be flown by tuning the Nav receiver to the proper frequency and selecting that Nav receiver on the CDI.

The G1000 WAAS GPS allows for flying LNAV, LNAV/VNAV, and LPV approaches according to the published chart. The active appoach type is annunciated on the HSI as shown in the following table:

HSI ANNUNCIATION	DESCRIPTION
LNAV	GPS approach using published LNAV minima.
LNAV+V	GPS approach using published LNAV minima. Advisory vertical guidance is provided.
L/VNAV	GPS approach using published LNAV/VNAV minima.
LPV	GPS approach using published LPV minima.

Load and/or Activate an Approach Procedure

1) Press the **PROC** Key.
2) Turn the large **FMS** Knob to highlight 'SELECT APPROACH'.
3) Press the **ENT** Key.
4) If a flight plan is active, the destination airport is displayed as the default. A list of available approaches is also displayed. If no flight plan is active, use the **FMS** Knobs to enter the identifier of the desired airport. Press the **ENT** Key.
5) Turn the large **FMS** Knob to highlight the Approach field. Turn the small **FMS** Knob to display a list of available approaches.

Figure 9-6 Selecting an Approach Procedure

6) Turn either **FMS** Knob to highlight the desired approach. Press the **ENT** Key.
7) The cursor moves to the TRANSITIONS field. Turn the large **FMS** Knob to highlight the desired transition waypoint and press the **ENT** Key. (The "Vectors" option assumes vectors will be received to the final course segment of the approach and will provide navigation guidance relative to the final approach course.)

Figure 9-7 Selecting an Approach Transition

8) Turn the large **FMS** Knob to highlight 'Activate?' and press the **ENT** Key to activate the approach. Activating the approach initiates a direct-to for IAF and the G1000 immediately begins navigating to the IAF. Selecting 'Load?' adds the procedure to the flight plan without immediately using it for navigation guidance.

Activate An Approach in the Active Flight Plan

1) With the Navigation Map Page displayed, press the **PROC** Key.
2) Turn the large **FMS** Knob to highlight 'ACTIVATE APPROACH'.
3) Press the **ENT** Key. The approach procedure is now active and a direct-to is initiated to the IAF.

Blank Page

SECTION 10: HAZARD AVOIDANCE

10.1 CUSTOMIZING THE HAZARD DISPLAYS ON THE NAVIGATION MAP

1) With the Navigation Map Page displayed, press the **MENU** Key to display the Navigation Map Page Menu. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed. Turn the small **FMS** Knob to select the 'Weather' group (Figure 10-2) to customize the display of weather features. Select 'Traffic' to customize the display of traffic.
3) Press the small **FMS** Knob to return to the Navigation Map Page.

Figure 10-1 Page Menu

Figure 10-2 Map Setup Menu

Figure 10-3 Map Setup Group List

10.2 STORMSCOPE® (OPTIONAL)

WARNING: *Weather information on the G1000 MFD is approved for weather avoidance only, not weather penetration. Refer to the WX-500 Pilot's Guide for detailed operation.*

Displaying Stormscope Lightning Data on the Navigation Map Page

1) Select the **MAP** Softkey.
2) Select the **STRMSCP** Softkey. Select the **STRMSCP** Softkey again to remove Stormscope Lightning Data from the Navigation Map Page.

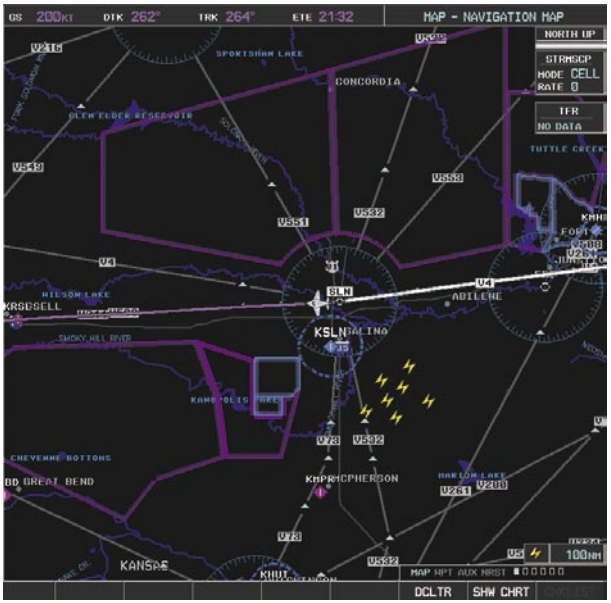


Figure 10-4 In-Flight Navigation Map Page Displaying Stormscope Lightning Data

Lightning Age	Symbol
Strike is less than 6 seconds old	
Strike is between 6 and 60 seconds old	
Strike is between 1 and 2 minutes old	
Strike is between 2 and 3 minutes old	

At a map range of less than 25 nm, Stormscope lightning data is not displayed, but can still be present. The presence of Stormscope lightning data is indicated by the annunciation 'LTNG < 25 nm' in the upper right corner.

Figure 10-5 Lightning Display Range Annunciation

Select 'cell' or 'strike' as the Stormscope lightning mode:

1) With the Weather Group selected, press the **ENT** Key. The cursor flashes on 'STRMSCP LTNG'.
2) Turn the large **FMS** Knob to select 'STRMSCP MODE'.
3) Turn the small **FMS** Knob to display the 'Cell/Strike' window.
4) Turn either **FMS** Knob to select 'Cell' or 'Strike'. Press the **ENT** Key.
5) Push the **FMS** Knob to return to the Navigation Map Page.

Clear Stormscope lightning data from the Navigation Map Page:

1) Press the **MENU** Key (with the Navigation Map Page displayed).
2) Turn either **FMS** Knob to highlight the 'Clear Stormscope® Lightning' field and press the **ENT** Key.

Stormscope Page

1) Turn the large **FMS** Knob until the Map Page group is selected.
2) Turn the small **FMS** Knob until the Stormscope Page is selected.

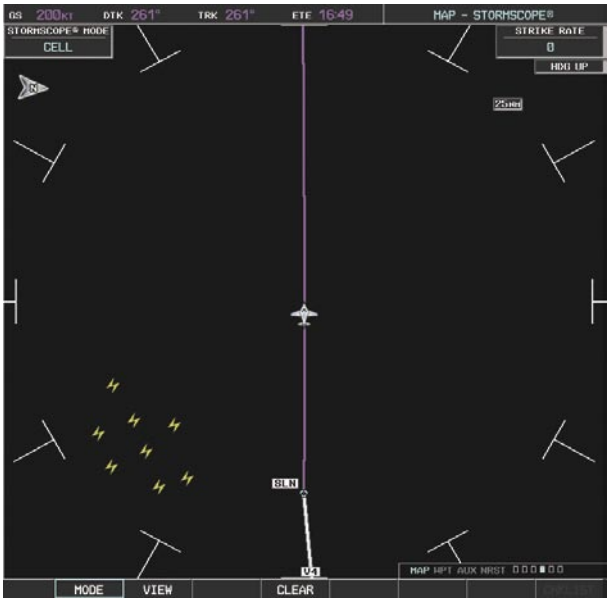


Figure 10-6 Stormscope Page

Change the Stormscope lightning mode between 'cell' and 'strike':

1) Select the Stormscope Page.
2) Select the **MODE** Softkey. The **CELL** and **STRIKE** Softkeys are displayed. Select the **CELL** Softkey to display 'CELL' data or select the **STRIKE** Softkey to display 'STRIKE' data. 'CELL' or 'STRIKE' is displayed in the mode box located in the upper left corner of the Stormscope Page.

NOTE: *"Cell mode" uses a clustering program to identify clusters of electrical activity that indicate cells.*

Change the viewing mode between 360° and 120°:

1) Select the Stormscope Page.
2) Select the **VIEW** Softkey. The **360** and **ARC** Softkeys are displayed. Select the **360** Softkey to display a 360° viewing area or select the **ARC** Softkey to display a 120° viewing area.

Select the **CLEAR** Softkey to remove all Stormscope lightning data from the display.

10.3 XM WEATHER (OPTIONAL)

WARNING: *Use of XM weather for hazardous weather penetration is not recommended. Weather information provided by XM Radio Service is approved only for weather avoidance, not penetration.*

1) From the Navigation Map Page, select the **MAP** Softkey.
2) Select the **NEXRAD or XM LTNG** Softkey to display the desired weather. Press the applicable softkey again to remove weather data from the Navigation Map Page.

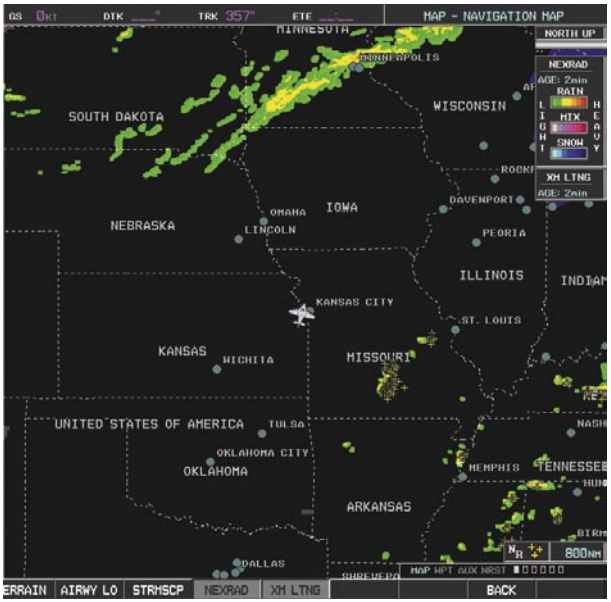


Figure 10-7 Navigation Map Page Displaying NEXRAD Weather

Displaying METAR and TAF information on the Airport Information Page

Display METAR and TAF text on the Airport Information Page:

1) Turn the large **FMS** Knob to select the WPT Page Group.
2) Turn the small **FMS** Knob to select the Airport Information Page.
3) Select the **WX** Softkey to display METAR and TAF text (METAR and TAF information is updated every 12 minutes).

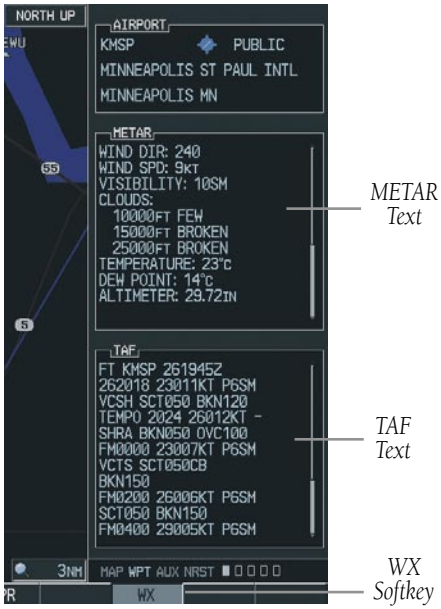
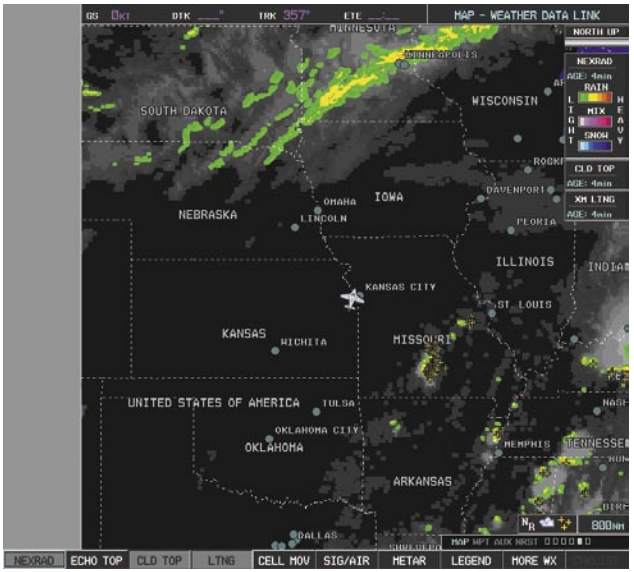


Figure 10-8 METAR and TAF Text Displayed on the Airport (Weather) Information Page

Displaying Weather on the Weather Data Link Page

Select the Weather Data Link Page:

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the Weather Data Link Page.
3) Press the available softkeys to select the desired XM weather product.
4) Select the **LEGEND** Softkey to view the legends for the selected products. If necessary, turn either **FMS** Knob to scroll through the list. Press the small **FMS** Knob or the **ENT** Key to return to the map.



NEXRAD – select the **NEXRAD** Softkey to show NEXRAD weather and radar coverage information. Areas where radar coverage is not available are shown in grayish-purple. The display is updated every five minutes.

NEXRAD Limitations

Certain limitations exist regarding the NEXRAD radar displays. Some, but not all, are listed here:

- NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (hail vs. rain, etc).
- An individual NEXRAD site cannot depict high altitude storms at close ranges and has no information about storms directly over the site.
- The resolution of displayed NEXRAD data is 4 square kilometers. Therefore, each square block is 2 kilometers on each side. The intensity level reflected by the square is the highest level sampled within the square area.

ECHO TOP – select the **ECHO TOP** Softkey to show the location, elevation, and direction of the highest radar echo. This may not indicate the top of a storm or clouds, only the highest radar return echo. ECHO TOPS cannot be displayed along with NEXRAD and CLOUD TOPS. When ECHO TOPS is activated, NEXRAD and CLOUD TOPS are removed. Refer to the Legend for a description of the ECHO TOPS coding. The display is updated every 7.5 minutes.

CLD TOP – select the **CLD TOP** Softkey to show the cloud top altitude determined from satellite imagery. The display is updated every 15 minutes.

LTNG – selecting the **LTNG** Softkey shows the location of cloud-to-ground lightning strikes. The display is updated every five minutes.

NOTE: *Strikes depicted represent cloud to ground strikes within a 2 kilometer radius of the actual strike location. Therefore, the exact location of the strike is not displayed.*

CELL MOV – selecting the **CELL MOV** Softkey shows storm cell movement by displaying an arrow. pointing in the direction of predicted movement. The display is updated every 12 minutes.

SIG/AIR – selecting the **SIG/AIR** Softkey shows SIGMET and AIRMET information. The display is updated every 12 minutes.

METAR – select the **METAR** Softkey to graphically display METARs. METARS are shown as colored flags at airports providing METAR reports. The display is updated every 12 minutes.

MORE WX – select the **MORE WX** Softkey to display the following group of softkeys for additional weather control:

SFC – selecting the **SFC** Softkey for Surface Analysis shows current or forecast conditions. Forecasts are available for intervals of Current, 12, 24, 36, and 48 hours. Select the softkey corresponding to the desired forecast. The closest city forecast information is displayed in the legend. The display is updated every 12 minutes.

FRZ LVL – select the **FRZ LVL** Softkey to display contour lines for freezing levels. The display is updated every 12 minutes.

WIND – select the **WIND** Softkey to show wind speed and direction at a selected altitude from the ground up to 42,000 feet in 3,000 foot increments. After selecting the **WIND** Softkey, select the softkey corresponding to the desired winds aloft altitude. The display is updated every 12 minutes.

COUNTY – selecting the **COUNTY** Softkey provides specific public awareness and protection weather warnings for Tornado, Severe Thunderstorm, and Flood conditions provided by the National Weather Service (NWS). The display is updated every 5 minutes.

CYCLONE – selecting the **CYCLONE** Softkey shows the current location of cyclones (hurricanes and tropical storms) and their projected track at various time intervals. The update rate is every 12 minutes.

Map Panning Information – Weather Data Link Page

1) Push in the **Joystick** to display the panning arrow.
2) Move the **Joystick** to place the panning arrow on AIRMETs, TFRs, METARs, or SIGMETs. Press the **ENT** Key to display pertinent information for the selected product.

   Note that pressing the **ENT** Key when panning over an AIRMET or a SIGMET displays an information box that displays the text of the report. Panning over an airport with METAR information does not display more information but allows the user to press the **ENT** Key and select that Airport's Information Page to display the text of the report. Pressing the **ENT** Key when panning over a TFR displays TFR specific information.

Weather Products and Symbols

Figure 10-10 depicts the symbol for each weather product (read from left to right). When a weather product is active, the product symbol is displayed in the lower right of the screen.

- NEXRAD
- Cloud Top/Echo Top
- XM Lightning
- Cell Movement
- SIGMETs/AIRMETs
- METARs
- City Forecast
- Surface Analysis
- Freezing Levels
- Winds Aloft

- County Warnings
- Cyclone Warnings

Figure 10-10 Weather Product Symbols

The XM Information Page in the AUX Page Group displays the weather products available for the current subscription. A green box by the weather product means that it is available.

NOTE: *The* ***LOCK*** *Softkey on the AUX - XM INFORMATION page is used to save the GDL 69(A) activation data when the XM services are initially set up. It is not used during normal operation of the GDL 69(A), and it should have no adverse effects if inadvertently selected during flight. Refer to the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04, Rev E or later) for further information.*

Weather Product Age

The age for each of the enabled products is displayed on the right side of the display. Times are based on GMT time when the data was assembled on the ground, not the time the data was received by the XM receiver. When the age of a weather product has exceeded half of the expiration time, the product time changes from light blue to amber in color.

Weather Product	Expires After (minutes)
SIGMETs/AIRMETs	60
City Forecasts	90
County Warnings	60
Cyclone Warnings	60
Echo Tops	30
Freezing Levels	60
METARs	90
Lightning	30
NEXRAD	30
Radar Coverage	30
Cell Movement	30
Surface Analysis	60
TFRs	60
Winds Aloft	60
TAFs	60
Clouds Tops	60

10.4 TRAFFIC ADVISORY SYSTEM (TAS)

Refer to the Honeywell KTA 870 Pilot's Guide for a detailed discussion of the KTA 870 system.

System Self Test

1) Set the range to 2/6 nm.
2) Select the **STANDBY** Softkey.
3) Select the **TEST** Softkey.
4) Self test takes approximately eight seconds to complete. When completed successfully, traffic symbols are displayed as shown in Figure 10-11 and a voice alert "TAS System Test OK" is heard. If the self test fails, the system reverts to Standby Mode and a voice alert "TAS System Test Fail" is heard.

Figure 10-11 Self Test OK Display

Displaying Traffic on the Traffic Map Page

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the second rectangular page icon.
3) Select the **NORMAL** Softkey. When the aircraft is airborne, the system will automatically begin displaying traffic on the map. 'OPERATING' is displayed in the Traffic Mode field.
4) Select the **ALT MODE** Softkey to change the altitude volume. Select the desired altitude volume by selecting the **BELOW**, **NORMAL**, **ABOVE**, or **UNREST** (unrestricted) Softkey. The selection is displayed in the Altitude Mode field.
5) Select the **STANDBY** Softkey to place the system in the Standby Mode. 'STANDBY' is displayed in the Traffic Mode field.
6) Rotate the **Joystick** clockwise to display a larger area or rotate counter-clockwise to display a smaller area.

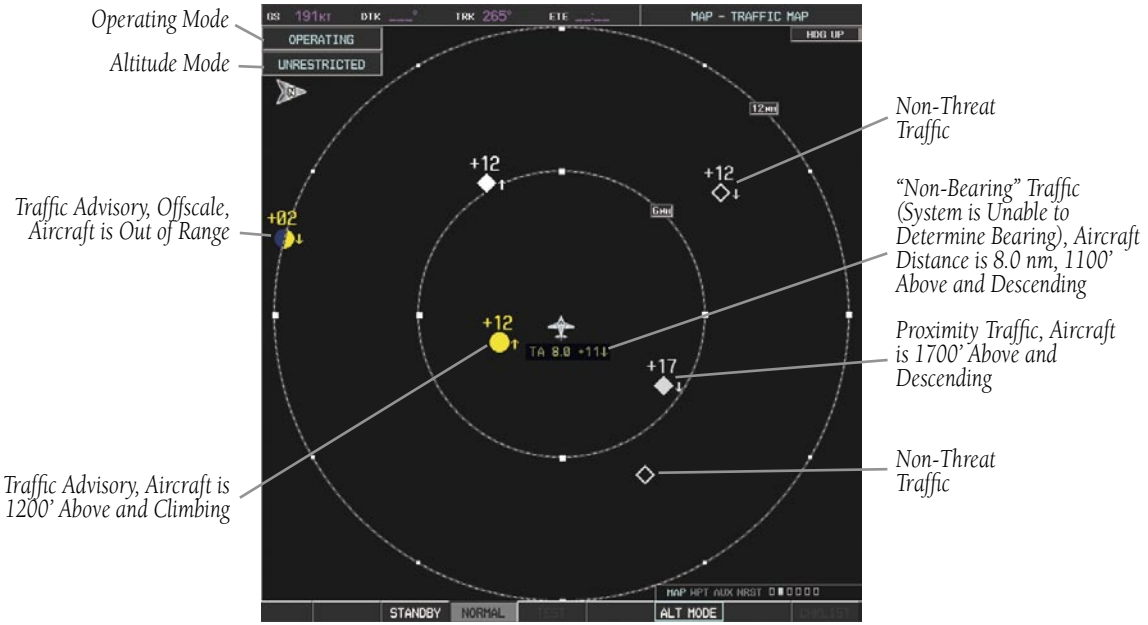

Operating Mode
Altitude Mode
Traffic Advisory, Offscale, Aircraft is Out of Range
Traffic Advisory, Aircraft is 1200' Above and Climbing
Non-Threat Traffic
"Non-Bearing" Traffic (System is Unable to Determine Bearing), Aircraft Distance is 8.0 nm, 1100' Above and Descending
Proximity Traffic, Aircraft is 1700' Above and Descending
Non-Threat Traffic
MAP - TRAFFIC MAP
OPERATING
UNRESTRICTED
HDG UP
TA 8.0 +11
STANDBY
NORMAL
ALT MODE

Figure 10-12 Traffic Map Page

Displaying Traffic on the Navigation Map

1) Ensure the KTA 870 system is operating. With the Navigation Map displayed, select the **MAP** Softkey.
2) Select the **TRAFFIC** Softkey. Traffic is now displayed on the map.

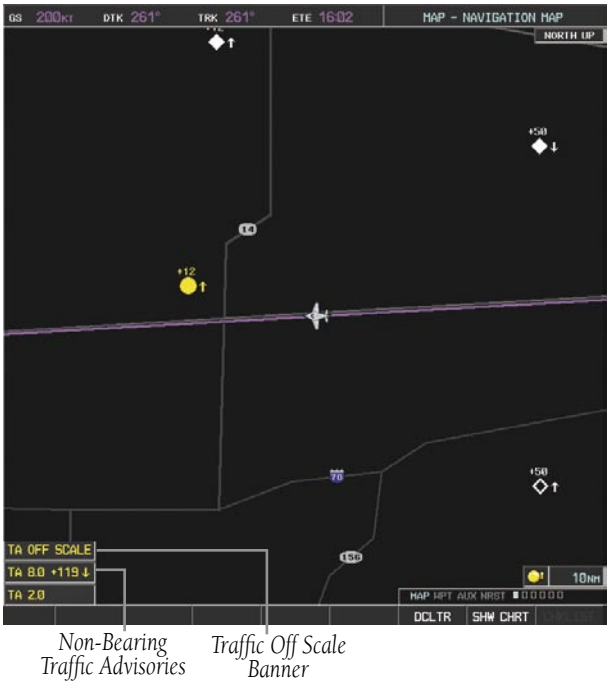


Figure 10-13 TAS Traffic on Navigation Map

10.5 TERRAIN AND OBSTACLE PROXIMITY

NOTE: Terrain data is not displayed when the aircraft latitude is greater than 75 degrees north or 60 degrees south.

Displaying Terrain and Obstacles on the Terrain Proximity Page

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the last rectangular page icon.
3) If desired, select the **VIEW** Softkey to access the **ARC** and **360** Softkeys. When the **ARC** Softkey is selected, a radar-like 120° view is displayed. Select the **360** Softkey to return to the 360° default display.
4) Rotate the **Joystick** clockwise to display a larger area or rotate counter-clockwise to display a smaller area.

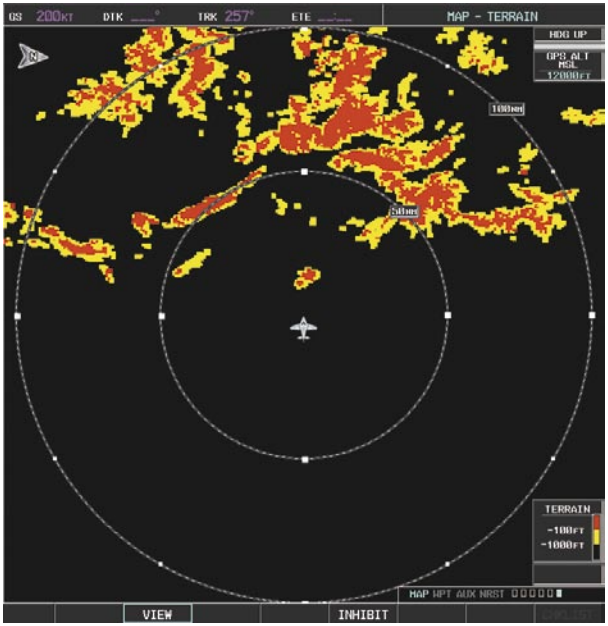
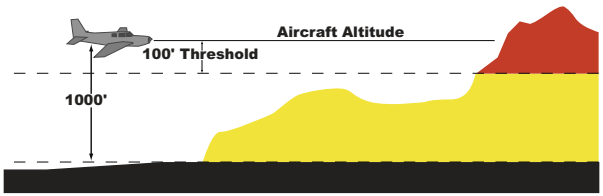


Figure 10-14 Terrain Proximity Page

Color	Indication
RED	Terrain/Obstacle above or within 100' below current aircraft altitude.
YELLOW	Terrain/Obstacle between 100' and 1000' below current aircraft altitude.



Unlighted Obstacle (Height is less than 1000' AGL)	Lighted Obstacle (Height is less than 1000' AGL)	Unlighted Obstacle (Height is greater than 1000' AGL)	Lighted Obstacle (Height is greater than 1000' AGL)

Figure 10-15 Obstacle Symbols

Displaying Terrain and Obstacles on the Navigation Map

1) With the Navigation Map displayed, select the **MAP** Softkey.
2) Select the **TERRAIN** Softkey. Terrain and obstacle proximity is now be displayed on the map.

10.6 TERRAIN AWARENESS & WARNING SYSTEM (TAWS) DISPLAY (OPTIONAL)

NOTE: *Terrain data is not displayed when the aircraft latitude is greater than 75 degrees north or 60 degrees south.*

NOTE: *TAWS operation is only available when the G1000 is configured for a TAWS-B installation.*

Displaying Terrain on the TAWS Page

1) Turn the large **FMS** Knob to select the Map Page Group.
2) Turn the small **FMS** Knob to select the TAWS Page.
3) If desired, select the **VIEW** Softkey to access the **ARC** and **360** Softkeys. When the **ARC** Softkey is selected, a radar-like 120° view is displayed. Select the **360** Softkey to return to the 360° default display.
4) Rotate the **Joystick** clockwise to display a larger area or rotate counter-clockwise to display a smaller area.

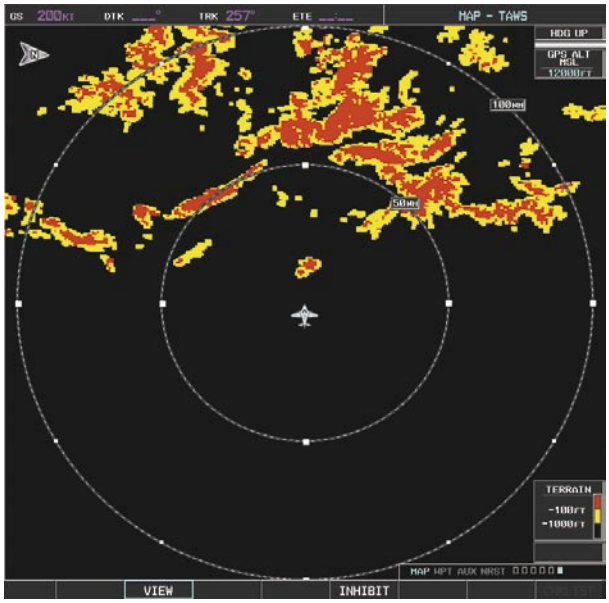


Figure 10-16 TAWS Page (360° View)

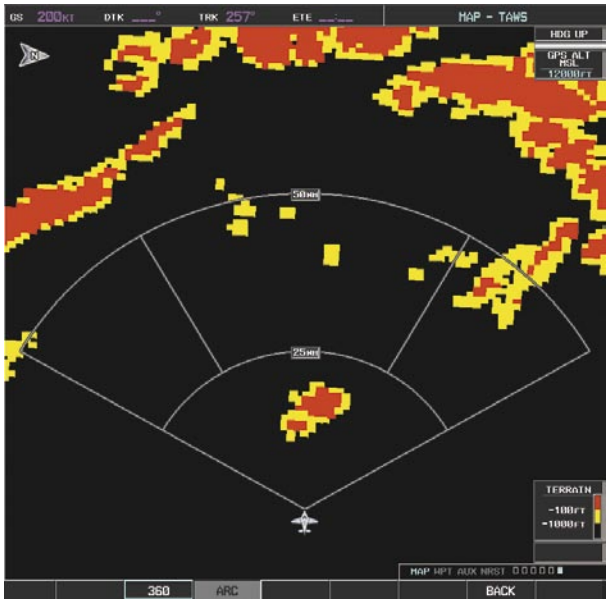
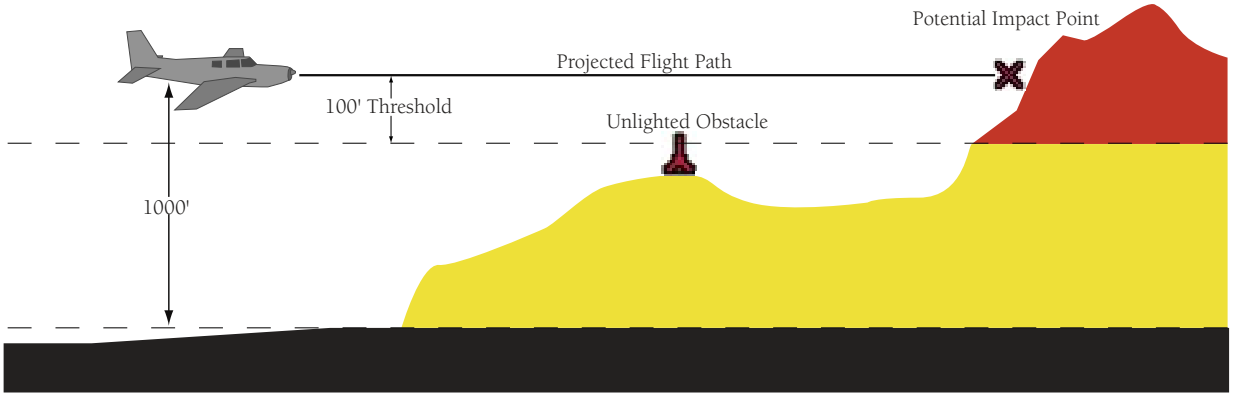


Figure 10-17 TAWS Page (ARC View)

Color	Terrain/Obstacle Location	Alert Level
Red	Terrain/Obstacle above or within 100' below current aircraft altitude.	WARNING
Yellow	Terrain/Obstacle between 100' and 1000' below current aircraft altitude.	CAUTION
Black	Terrain/Obstacle is more than 1000' below aircraft altitude.	NO DANGER



Enable/Disable Aviation Data

1) While the TAWS Page is displayed, press the **MENU** Key.
2) Turn the small **FMS** Knob to select "Show (or Hide) Aviation Data".
3) Press the **ENT** Key.

Figure 10-18 TAWS Page Menu

TAWS Inhibit

Flying VFR into an area where unique terrain exists could cause the system to annunciate a nuisance alert. When TAWS is inhibited, only FLTA and PDA alerts are disabled.

Inhibit TAWS:

While the TAWS Page is displayed, select the **INHIBIT** Softkey. 'TAWS INHB' is annunciated in the lower right of portion of the screen.

Enable TAWS:

If TAWS has been inhibited, from the TAWS Page select the **INHIBIT** Softkey. The 'TAWS INHB" annunciation is removed.

NOTE: If TAWS alerts are inhibited when the Final Approach Fix is the active waypoint in a GPS WAAS approach, a LOW ALT annunciation may appear on the PFD next to the altimeter if the current aircraft altitude is at least 164 feet below the prescribed altitude at the Final Approach Fix.

Manual System Test

A system test is automatically performed at power-up. After sucessful completion of the test, "***TAWS System Test, OK***" is heard.

The system test may also be initiated manually, but only when the aircraft is on the ground. To manually verify proper operation of the aural and visual annunciations of the system, perform the following steps.

1) While the TAWS Page is displayed, press the **MENU** Key.
2) Turn the small **FMS** Knob to select 'Test TAWS'.
3) Press the **ENT** Key. During the test 'TAWS TEST' is displayed in the center of the TAWS Page.

   When all is in working order, "TAWS System Test, OK" is heard.

Forward Looking Terrain Avoidance (FLTA)

The Forward Looking Terrain Avoidance alert is composed of two sub-functions:

Reduced Required Terrain Clearance (RTC) and Reduced Required Obstacle Clearance (ROC)

This provides alerts when the aircraft flight path is above terrain and/or obstacles, yet is projected to come within minimum clearance values outlined in the following table. When an RTC or ROC alert is issued, a potential impact point is displayed on the TAWS Page as a yellow or red 'X'.

Imminent Terrain Impact (ITI) and Imminent Obstacle Impact (IOI)

This provides alerts when the aircraft is below the elevation of terrain in the aircraft's projected path. ITI and IOI alerts are accompanied by a potential impact point displayed on the TAWS Page as a yellow or red 'X'. The alert is given when the projected vertical flight path is calculated to come within minimum clearance altitudes in the following table.

Phase of Flight	Level Flight	Descending
Enroute	700 ft.	500 ft.
Terminal	350 ft.	300 ft.
Approach	150 ft.	100 ft.
Departure	100 ft.	100 ft.

During the final approach phase of flight, RTC/ROC/ITI/IOI alerts are automatically inhibited when the aircraft is below 200 feet AGL while within 0.5 nm of the approach runway or is below 125 feet AGL while within 1 nm of the runway.

Premature Descent Alert (PDA)

A Premature Descent Alert is issued when the system detects that the aircraft is significantly below the normal approach path to a runway. The PDA alert mode functions only during descent to land.

PDA alerting begins when the aircraft is within 15 nm of the destination airport and ends when the aircraft is either 0.5 nm from the runway threshold OR is at an altitude of 125 feet AGL while within 1 nm of the threshold. During the final descent, algorithms will set a threshold for alerting based on speed, distance, and other parameters.

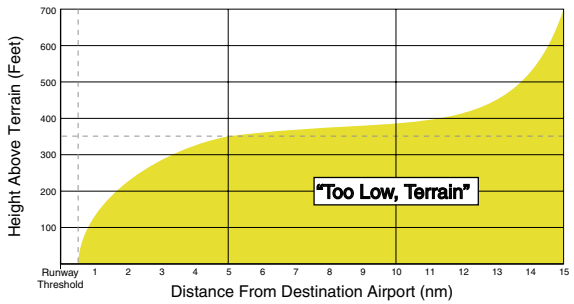


Figure 10-19 PDA Alerting

Excessive Descent Rate Alert (EDR)

The purpose of the Excessive Descent Rate alert is to provide suitable alerts when the aircraft is determined to be closing (descending) upon terrain at an excessive speed. Figure 10-20 displays the correlation between height above terrain and descent rate, resulting in the two EDR alerts. EDR alerts have two levels of severity, caution (sink rate) and warning (pull-up).

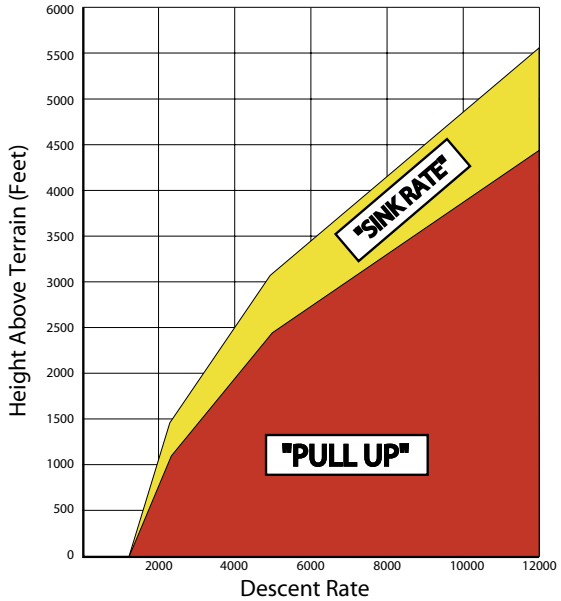
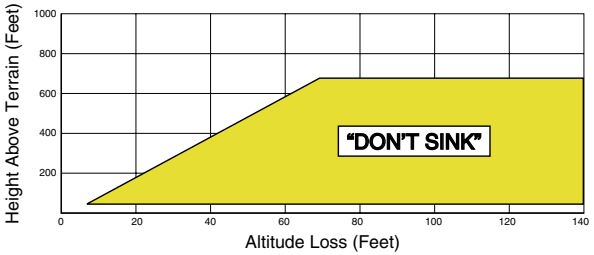


Figure 10-20 Excessive Descent Rate

Negative Climb Rate After Takeoff Alert (NCR)

The purpose of the Negative Climb Rate After Takeoff alert is to provide suitable alerts to the pilot when the system determines that the aircraft is losing altitude (closing upon terrain) after takeoff. The aural message "***Don't Sink***" is given for NCR alerts, accompanied by an annunciation and a pop-up terrain alert on the display.



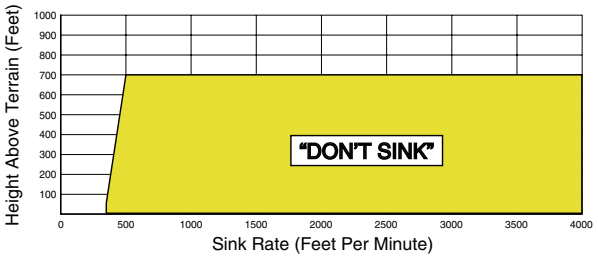


Figure 10-21 Negative Climb Rate

"Five-Hundred" Aural Alert

The purpose of the aural alert message "Five-hundred" is to provide an advisory alert to the aircrew that the aircraft is five-hundred feet above terrain. When the aircraft descends within 500 feet of terrain, the aural message "***Five-hundred***" is heard. There are no display annunciations or pop-up alerts that accompany the aural message.

Displaying Terrain and Obstacles on the Navigation Map

1) With the Navigation Map displayed, select the **MAP** Softkey.
2) Select the **TERRAIN** Softkey. Terrain and obstacle proximity is now displayed on the map.

Unlighted Obstacle (Height is less than 1000' AGL)	Lighted Obstacle (Height is less than 1000' AGL)	Unlighted Obstacle (Height is greater than 1000' AGL)	Lighted Obstacle (Height is greater than 1000' AGL)	Potential Impact Points

Figure 10-22 TAWS Symbols

Pop-up Alerts

When the Navigation Map Page is displayed, and a terrain or obstacle alert is issued, a pop-up window is displayed with the appropriate alert.

Figure 10-23 Alert Pop-Up

Press the **ENT** Key to display the TAWS Page, or press the **CLR** Key to remain on the Navigation Map Page.

TAWS Alerts Summary

The following table shows the possible TAWS alert types with corresponding annunciations and aural messages.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK or TOO LOW - TERRAIN	"Don't Sink" or "Too Low, Terrain"

The following system status annunciations may also be issued.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available" "TAWS Availble" will be heard when sufficient GPS signal is re-established.
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

Alert Annunciations

Figure 10-24 Alert Annunciation on the TAWS Page

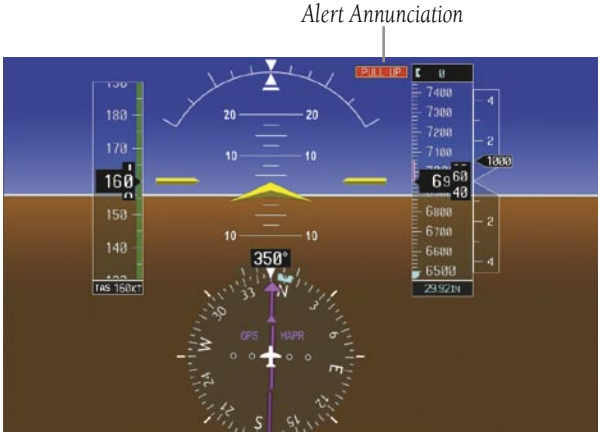


Figure 10-25 Alert Annunciation on the PFD

10.7 AIRBORNE COLOR WEATHER RADAR

Weather Radar Basics

Antenna Beam Illumination

It is important to understand the concept of the antenna beam illumination. The radar beam is much like the beam of a spotlight. The farther the beam travels, the wider it gets. The radar is only capable of "seeing" what is inside the boundaries of the beam.

Figure 10-26 depicts a radar beam's characteristics. The figure illustrates vertical dimensions of the radar beam, although the same holds true for the horizontal dimensions. In other words, the beam is as wide as it is tall. Note that it is possible not to see areas of precipitation on the radar display because of the antenna tilt setting. With the antenna tilt set to zero in this illustration, the beam overshoots the precipitation at 15 nautical miles. The curvature of the earth can also be a factor, especially at range settings of 150 nautical miles or more (Figure 10-27).

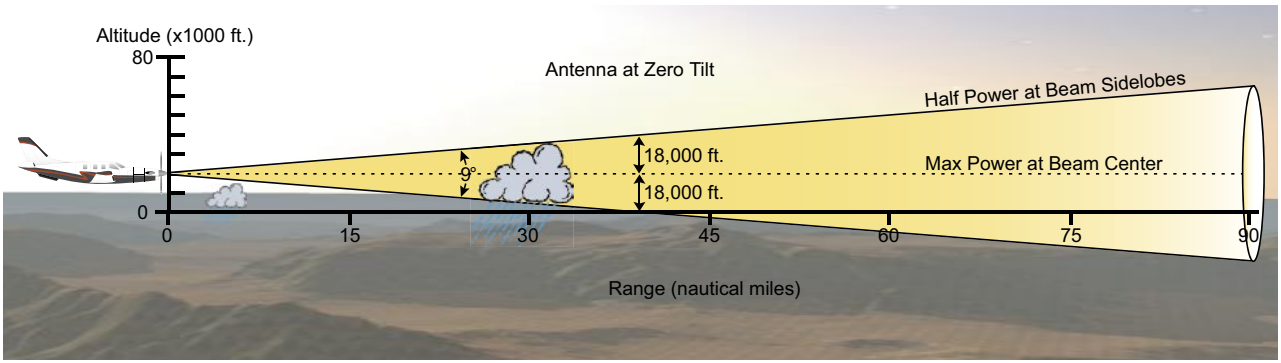


Figure 10-26 Radar Beam from 10 inch Antenna

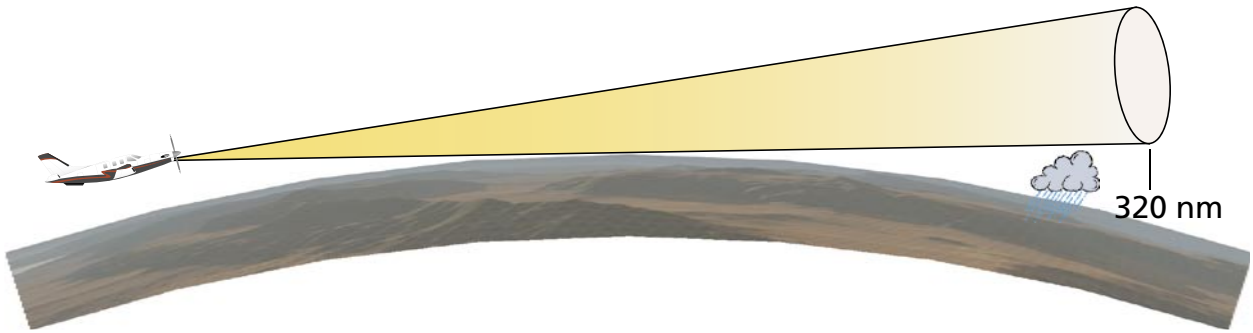


Figure 10-27 Radar Beam in Relation to the Curvature of the Earth

Radar Signal Attenuation

Attenuation because of distance is due to the fact that the radar energy leaving the antenna is inversely proportional to the square of the distance. The reflected radar energy from a target 40 miles away that fills the radar beam is one fourth the energy reflected from an equivalent target 20 miles away. This would appear to the operator that the storm is gaining intensity as the aircraft gets closer. The GWX 68 system compensates for much of this distance attenuation.

Attenuation due to precipitation is not as predictable as distance attenuation. It is also more intense. As the radar signal passes through moisture, a portion of the radar energy is reflected back to the antenna. However, much of the energy is absorbed. If precipitation is very heavy, or covers a large area, the signal may not reach completely through the area of precipitation. The weather radar system cannot distinguish between an attenuated signal and area of no precipitation. If the signal has been fully attenuated, the radar displays a "radar shadow". This appears as an end to the precipitation when, in fact, the heavy rain may extend much further. A cell containing heavy precipitation may block another cell located behind the first, preventing it from being displayed on the radar. Never fly into these shadowed areas and never assume that all of the heavy precipitation is being displayed unless another cell or a ground target can be seen beyond the heavy cell. The WATCH™ feature of the GWX 68 Weather Radar system can help in identifying these shadowed areas. Areas in question appear as 'shadowed' or gray area on the radar display. Proper use of the antenna tilt control can also help detect radar shadows.

Radar Signal Reflectivity

Precipitation

Precipitation or objects more dense than water, such as earth or solid structures, are detected by the weather radar. The weather radar will not detect clouds, thunderstorms or turbulence directly. It detects precipitation associated with clouds, thunderstorms, and turbulence. The best radar signal reflectors are raindrops, wet snow, or wet hail. The larger the raindrop the better it reflects. The size of the precipitation droplet is the most important factor in radar reflectivity. Because large drops in a small concentrated area are characteristic of a severe thunderstorm, the radar displays the storm as a strong return. Ice, dry snow, and dry hail have low levels of reflectivity (Figure 10-28) and often will not be displayed by the radar. Additionally, a cloud that contains only small raindrops, such as fog or drizzle, will not reflect enough radar energy to produce a measurable target return.

Figure 10-28 Precipitation Type and Reflectivity

Ground Returns

The intensity of ground target returns depends upon the angle at which the radar beam strikes the ground target (Angle of Incidence) and the reflective properties of that target. The gain can be adjusted so shorelines, rivers, lakes, and cities are well-defined. Increasing gain too much causes the display to fill in between targets, thus obscuring some landmarks.

Angle of Incidence

The angle at which the radar beam strikes the target is called the Angle of Incidence. Figure 10-29 illustrates the incident angle ('A'). This directly affects the detectable range, the area of illumination, and the intensity of the displayed target returns. A large incident angle gives the radar system a smaller detectable range and lower display intensity due to minimized reflection of the radar energy.

A smaller incident angle gives the radar a larger detectable range of operation and the target display will show a higher intensity. Since more radar energy is reflected back to the antenna with a low incident angle, the resulting detectable range is increased for mountainous terrain.

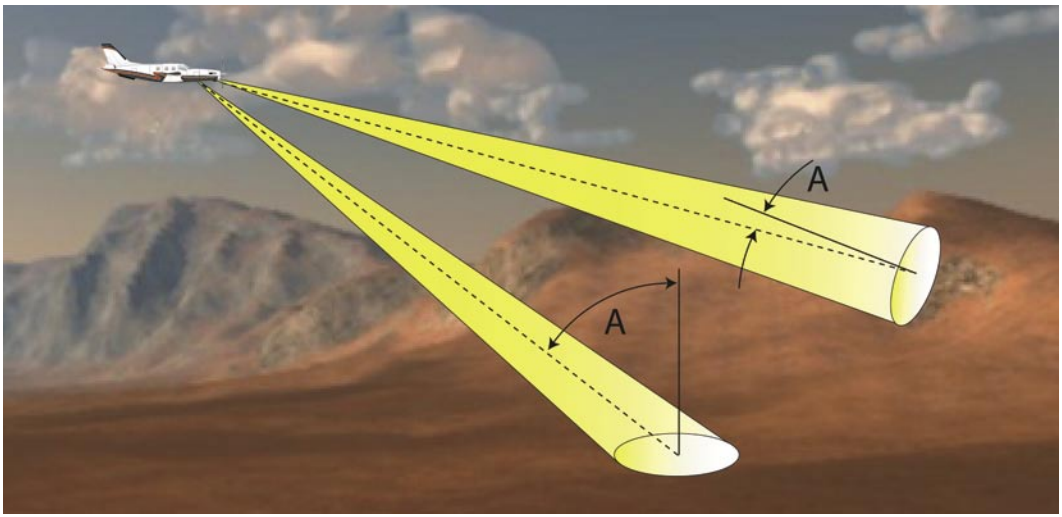


Figure 10-29 Angle of Incidence

Safe Operating Distance

The zone in which the radiation level exceeds the US Government standard of 1 mW/cm2 is the semicircular area of at least 9.16 feet from the 10-inch antenna (Figure 10-30). All personnel must remain outside of this zone. With a scanning or rotating beam, the averaged power density at the Maximum Permissible Exposure Level (MPEL) boundary is significantly reduced.

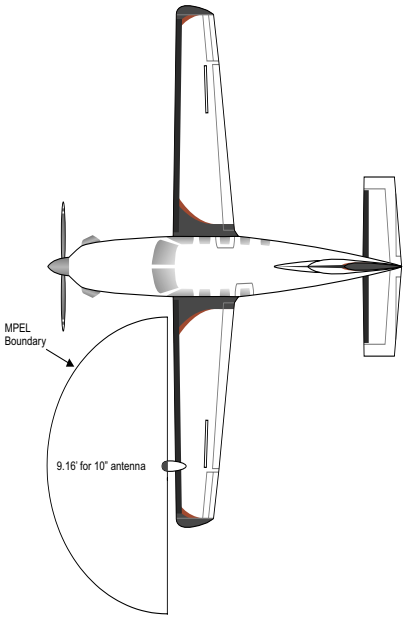


Figure 10-30 MPEL Boundary

Basic Antenna Tilt Setup

Normally, the bottom of the radar beam is four degrees below parallel with the ground.

With the aircraft flying level, adjust the antenna tilt so ground returns are displayed at a distance that equals the aircraft's current altitude (AGL) divided by 1,000. For example, if the aircraft is at 14,000 feet, adjust the tilt so the front edge of ground returns are displayed at 14 nautical miles. Note this antenna tilt angle setting. Raise the antenna tilt 6 degrees above this setting. The bottom of the radar beam is now angled down 4 degrees from parallel with the ground.

With the antenna tilt set as previously described, any displayed target return should be scrutinized when flying at altitudes between 2,000 and 30,000 feet AGL. If the displayed target advances on the screen to 5 nautical of the aircraft, avoid it. This may be either weather or ground returns that are 2,000 feet or less below the aircraft. Raising the antenna tilt 4 degrees can help separate ground returns from weather returns in relatively flat terrain. This places the bottom of the radar beam parallel with the ground. Return the antenna tilt to the previous setting after a few sweeps.

This setup provides a good starting point for practical use of the GWX 68.

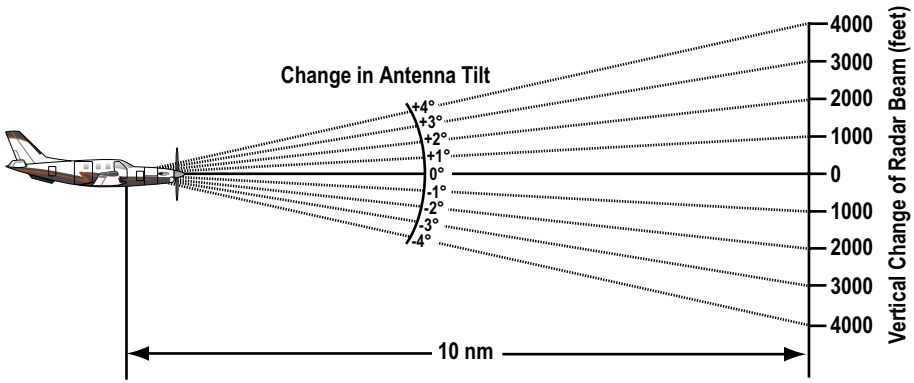


Figure 10-31 Vertical Change in Radar Beam per Nautical Mile

Weather Mapping and Interpretation

Weather Display Interpretation

When evaluating various target returns on the weather radar display, the colors denote precipitation intensity and rates as shown in Figure 10-32.

Weather Mode Color	Intensity	Approximate Precipitation Rate (in/hr.)
BLACK	< 23 dBZ	< .01.
GREEN	23 dBZ to < 32 dBZ	.01 - 0.1.
YELLOW	32 dBZ to < 41 dBZ	0.1 - 0.5
RED	41 dBZ to < 50 dBZ	0.5 - 2
MAGENTA	50 dBZ and greater	> 2

Figure 10-32 Precipitation Intensity Levels

Thunderstorms

Updrafts and downdrafts in thunderstorms carry water through the cloud. The more severe the drafts, the greater the number and size of the precipitation droplets. With this in mind, the following interpretations can be made from what is displayed on the weather radar. Avoid these areas by an extra wide margin.

- In areas where the displayed target intensity is red or magenta (indicating large amounts of precipitation), the turbulence is considered severe.
- Areas that show steep color gradients (intense color changes) over thin bands or short distances suggest irregular rainfall rate and strong turbulence.
- Areas that show red or magenta are associated with hail or turbulence, as well as heavy precipitation. Vertical scanning and antenna tilt management may be necessary to identify areas of maximum intensity.

Along squall lines (multiple cells or clusters of cells in a line (Figure 10-33), individual cells may be in different stages of development. Areas between closely spaced, intense targets may contain developing clouds not having enough moisture to produce a return. However, these areas could have strong updrafts or downdrafts. Targets showing wide areas of green are generally precipitation without severe turbulence.

Irregularities in the target return may also indicate turbulence, appearing as "hooks", "fingers", or "scalloped" edges (Figure 10-33). These irregularities may be present in green areas with no yellow, red, or magenta areas and should be treated as highly dangerous areas. Avoid these areas as if they were red or magenta areas.

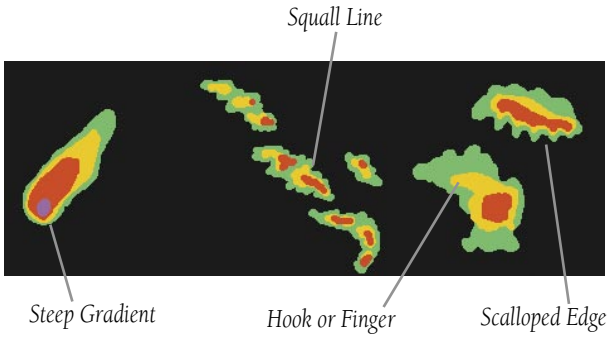


Figure 10-33 Cell Irregularities

When displaying shorter ranges, periodically select a longer range to see if problems are developing further out. That can help prevent getting trapped in a "blind alley" or an area that is closed at one end by convective weather (Figure 10-34).

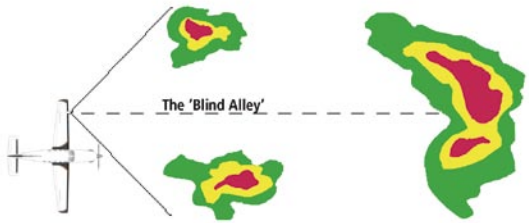


Figure 10-34 The 'Blind Alley' - Illustration

Tornadoes

There are no conclusive radar target return characteristics which identify a tornado. However, tornadoes may be present if the following characteristics are observed:

- A narrow, finger-like portion (Figure 10-33) extends and in a short time curls into a hook and closes on itself.
- A "hook", which may be in the general shape of the numeral 6, especially if bright and projecting from the southwest quadrant (northeast quadrant in the southern hemisphere) of a major thunderstorm.
- V-shaped notches.
- Doughnut shapes.

These shapes do not always indicate tornadoes, and tornado returns are not limited to these characteristics.

Hail

Hail can fall below the minimum reflectivity threshold for radar detection. It can have a film of water on its surface, making its reflective characteristics similar to a very large water droplet. Because of this film of water, and because hail stones usually are larger than water droplets, thunderstorms with large amounts of wet hail return stronger signals than those with rain. In the upper regions of a cell where ice particles are 'dry' (no liquid coating), target returns are less intense.

Hail shafts can be associated with the same radar target return characteristics as tornados.

Operation in Weather Mode

WARNING: *Begin transmitting only when it is safe to do so. When transmitting while the aircraft is on the ground, no personnel or objects should be within 11 feet of the antenna.*

CAUTION: *In Standby mode, the antenna is parked at the center line. It is always a good idea to put the radar in Standby mode before taxiing the aircraft to prevent the antenna from bouncing on the bottom stop and possibly causing damage to the radar assembly.*

When the weather radar system is in the Weather or Ground Map mode, the system automatically switches to Standby mode on landing.

In Reversionary mode, the weather radar system automatically switches to Standby mode. The system remains in Standby mode until both displays are restored. In Reversionary mode, the weather radar system cannot be controlled.

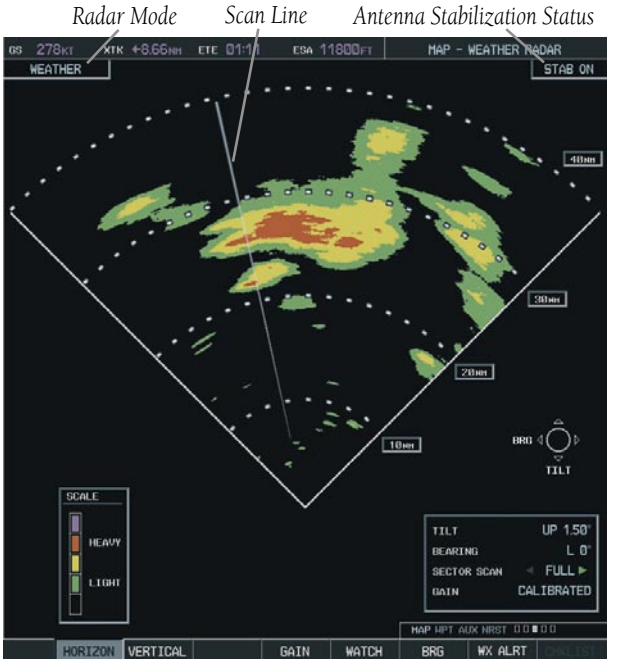


Figure 10-35 Horizontal Scan Display

Displaying Weather on the Weather Radar Page

1) Select the Map Page Group.
2) Select the Weather Radar Page.
3) Select the **MODE** Softkey.
4) To select Weather Mapping Mode:

   a) While on the ground, select the **STANDBY** Softkey. A one-minute warm-up period is initiated (countdown is displayed on the screen). After the warm-up is complete, the radar enters the Standby Mode.

   b) When the aircraft is airborne, select the **WEATHER** Softkey.

   Or:

   a) While on the ground, select the **WEATHER** Softkey. A confirmation window is displayed (Figure 10-36).

   b) Turn the small **FMS** Knob to highlight YES and press the **ENT** Key to continue radar activation.

   Or:

   If the aircraft is airborne, select the **WEATHER** Softkey. A one-minute warm-up period is initiated (countdown is displayed on the screen). After the warm-up is complete, the radar begins transmitting.
5) Turn the **Joystick** to select the desired map range.
6) The horizontal scan is initially displayed (Figure 10-35). If desired, select the **VERTICAL** Softkey to change to vertical scanning.

Figure 10-36 Confirming Activating Radar

Vertically Scanning a Storm Cell

NOTE: Vertical scanning of a storm cell should be done with the aircraft wings level to avoid constant adjustment of the Bearing Line.

1) While in the Horizontal Scan view, select the **BRG** Softkey. This places the cursor in the BEARING field and displays the Bearing Line (Figure 10-37).

   If the Bearing Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select 'Show Bearing Line'. Press the **ENT** Key.

2) Turn the small **FMS** Knob to place the Bearing Line on the desired storm cell or other area to be vertically scanned.

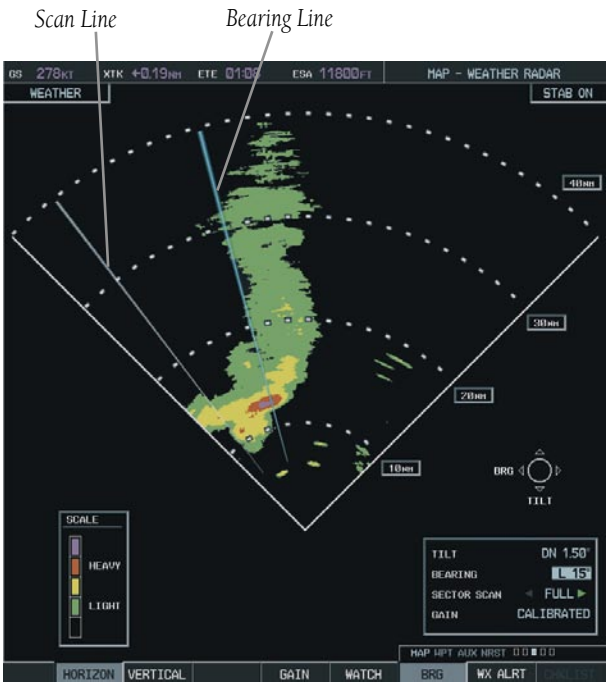


Figure 10-37 Bearing Line on Horizontal Scan

3) Select the **VERTICAL** Softkey. A vertical "slice" of the selected area is now displayed (Figure 10-38).

4) The small **FMS** Knob may be used to move the scanned "slice" a few degrees right or left.

5) Turn the **Joystick** to adjust the range.

6) Press the **FMS** Knob to remove the cursor.

7) To select a new area to be vertically scanned, select the **HORIZON** Softkey to return to the Horizontal Scan view and repeat the previous steps.

The **Joystick** can also be used to adjust bearing from left to right.

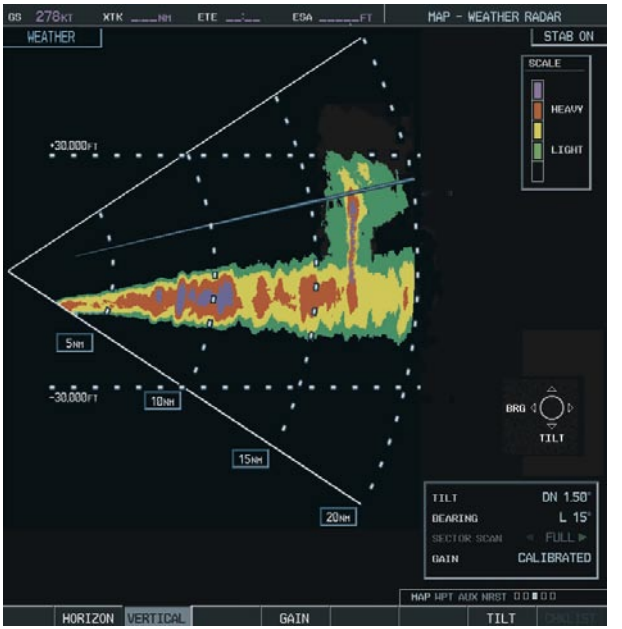


Figure 10-38 Vertical Scan Display

Adjusting Antenna Tilt Angle

In order to make an accurate interpretation of a storm cell, the radar beam should be pointed at the wet part of the weather cell to record the proper rainfall intensity (color level). The ideal aiming point is just below the freezing level of the storm. The best way to find this point is to use the Vertical Scan feature. The antenna tilt angle can be centered on the strongest return area in the vertical scan to get a more accurate view of the coverage and intensity of the target in the horizontal scan.

Adjusting Antenna Tilt on the Horizontal Scan Display

1) Press the **FMS** Knob to activate the cursor in the TILT field.
2) Turn the small **FMS** Knob to select the desired antenna tilt angle.
3) Press the **ENT** Key.
4) Press the **FMS** Knob to remove the cursor.

The **Joystick** can also be used to adjust tilt up and down.

Adjusting Antenna Tilt on the Vertical Scan Display

1) Select the **TILT** Softkey to activate the cursor in the TILT field and display the Tilt Line as seen in Figure 10-39.

   If the Tilt Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select 'Show Tilt Line'. Press the **ENT** Key.

2) Turn the small **FMS** Knob to adjust the antenna tilt angle. The selected tilt angle is implemented when Horizontal Scan is again selected.

   The **Joystick** can also be used to adjust tilt.

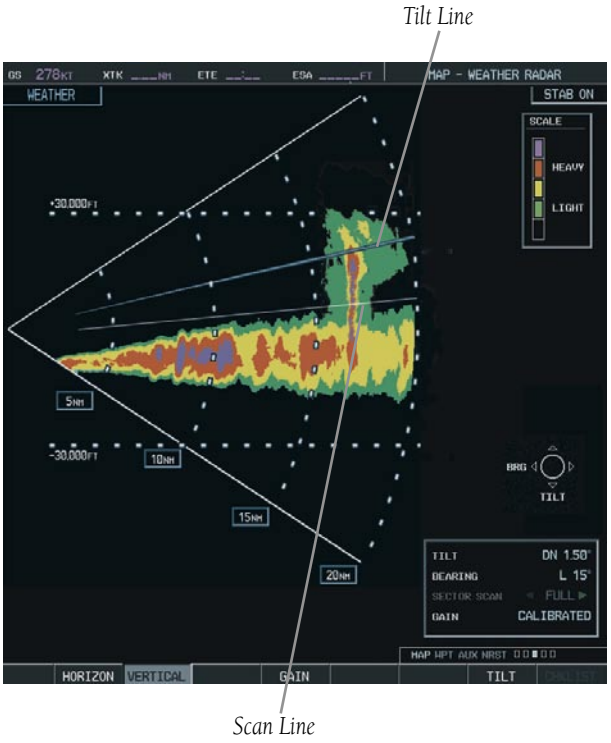


Figure 10-39 Adjusting Tilt on Vertical Scan Display

Adjusting Gain

WARNING: *Changing the gain in weather mode causes precipitation intensity to be displayed as a color not representative of the true intensity. See Figures 10-40 and 10-41. Remember to return the gain setting to 'Calibrated' for viewing the actual intensity of precipitation.*

1) Select the **GAIN** Softkey to activate the cursor in the GAIN field.
2) Turn the small **FMS** Knob to adjust the gain for the desirable level. The gain setting is visible in the GAIN field as a movable horizontal bar in a flashing box. The line pointer is a reference depicting the calibrated position.
3) Press the **FMS** Knob to remove the cursor.
4) Select the **GAIN** Softkey again to recalibrate the gain. CALIBRATED is displayed in the GAIN field.

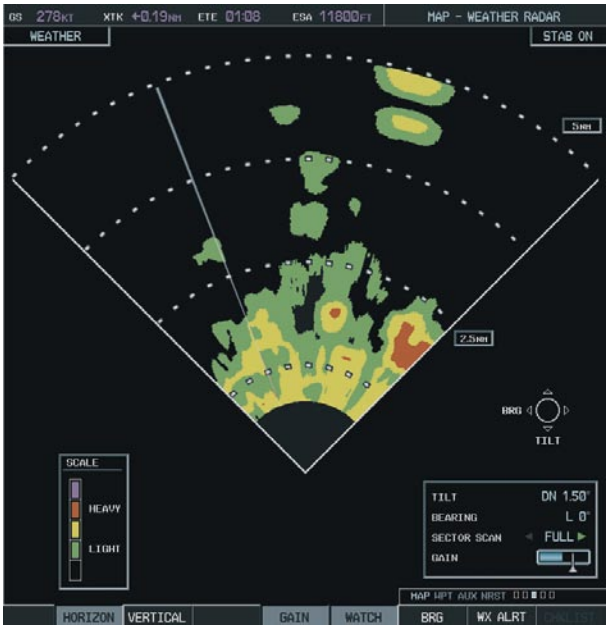


Figure 10-40 Manual Gain Set Below Calibrated

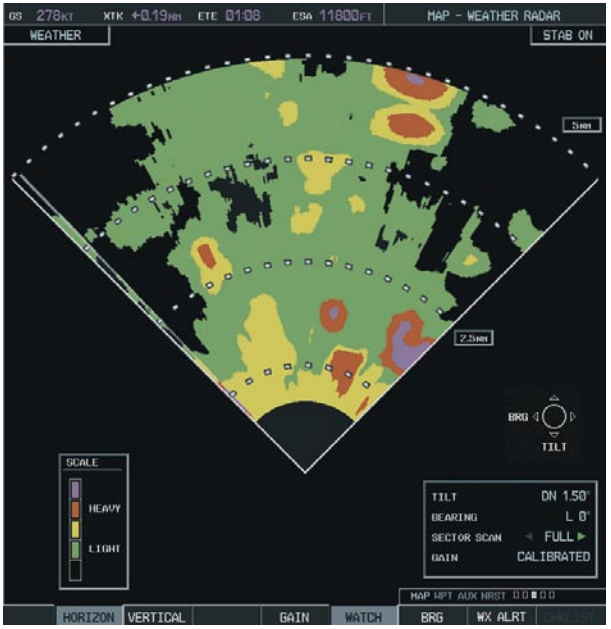


Figure 10-41 Calibrated Gain

Sector Scan

1) While in horizontal scan mode, select the **BRG** Softkey to display the Bearing Line and place the cursor in the BEARING field (Figure 10-42).

   If the Bearing Line is not displayed, press the **MENU** Key and turn the large **FMS** Knob to select 'Show Bearing Line'. Press the **ENT** Key.

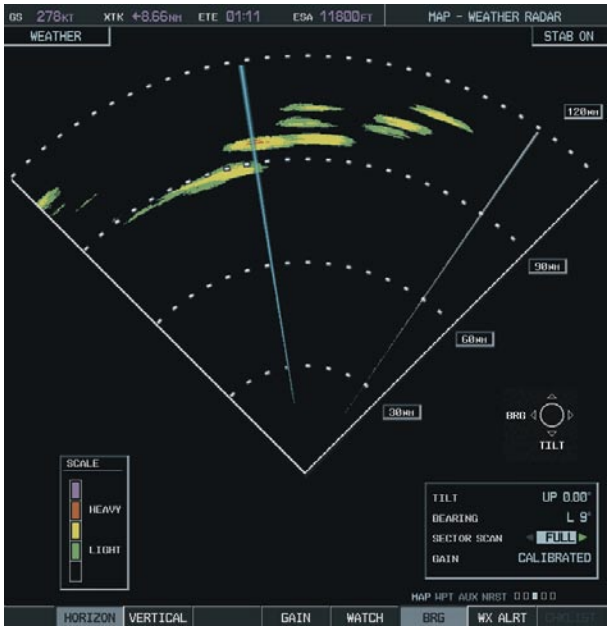


Figure 10-42 Selecting Sector Scan Position

2) Turn the small **FMS** Knob to place the Bearing Line in the desired position. The location of the Bearing Line becomes the center point of the Sector Scan.

3) Turn the large **FMS** Knob to place the cursor in the SECTOR SCAN field.

4) Turn the small **FMS** Knob to select FULL, 60˚, 40˚, or 20˚ scan.

5) If desired, readjust the Bearing Line as discussed previously to change the center of the Sector Scan.

6) Select the **BRG** Softkey again to remove the Bearing Line and cursor. The bearing reference is also reset to 0°.

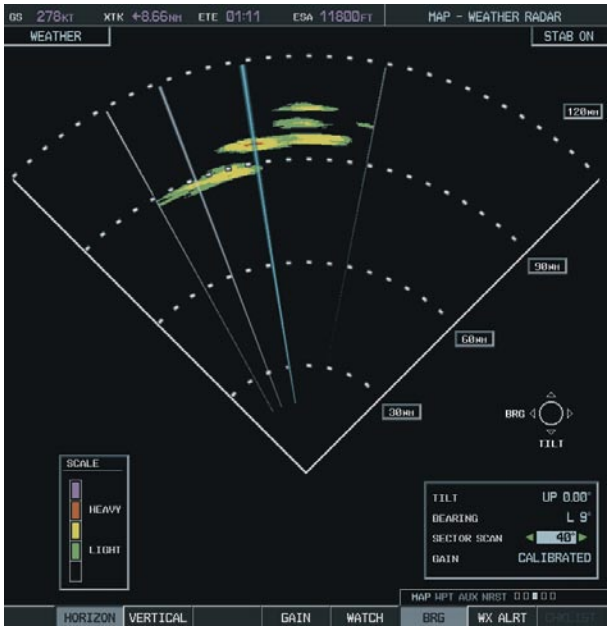


Figure 10-43 40˚ Sector Scan

Antenna Stabilization

1) To activate or deactivate the antenna stabilization, select the **MODE** Softkey.

2) Select the **STAB ON** Softkey to activate antenna stabilization or select the **STAB OFF** Softkey to deactivate. The current stabilization condition is shown in the upper right of the weather radar display.

Weather Attenuated Color Highlight (WATCH™)

While in horizontal scan mode, this feature can be used as a tool to determine areas of possible inaccuracies in displayed intensity due to weakening of the radar energy. This weakening is known as 'attenuation'. Accuracy of the displayed intensity of returns located in the shaded areas are suspect. Proper antenna tilt management should still be employed to determine the extent of attenuation in a shaded area.

To activate or deactivate the WATCH™ feature, select the **WATCH** Softkey.

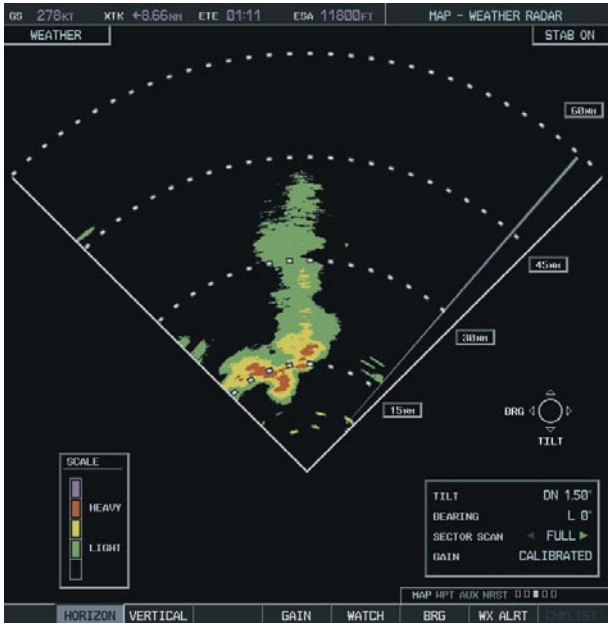


Figure 10-44 Horizontal Scan Without WATCH™

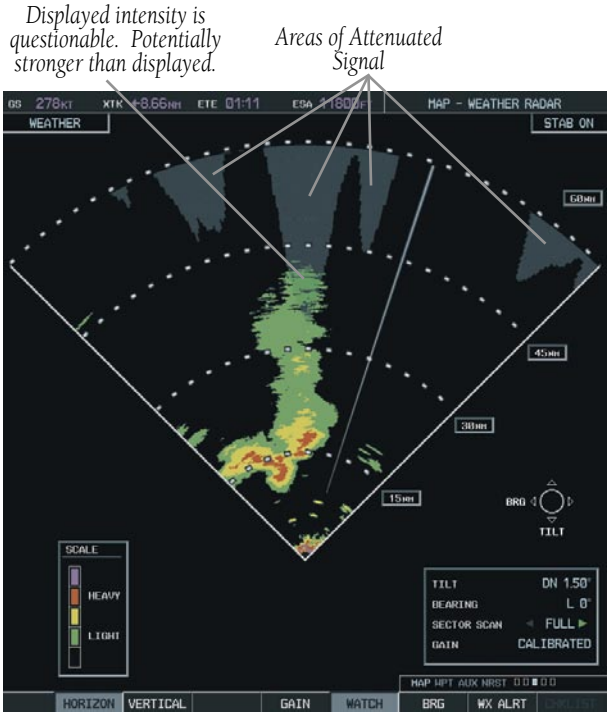


Figure 10-45 Horizontal Scan With WATCH™

Weather Alert

This feature may be used to indicate the presence of heavy precipitation beyond the currently displayed range and 80 to 320 nm from the aircraft's present position. Weather Alert targets appear as red bands along the outer range ring at the approximate azimuth of the detected returns (Figure 10-46).

If a Weather Alert is detected within ±10° of the aircraft heading, an alert is displayed on the PFD in the Messages Window as shown in Figure 10-47.

If the antenna tilt is adjusted too low, a weather alert can be generated by ground returns. To avoid this issue, set the display range to less than 80 nm in the terminal area. Weather alerts can also be deactivated in the terminal area.

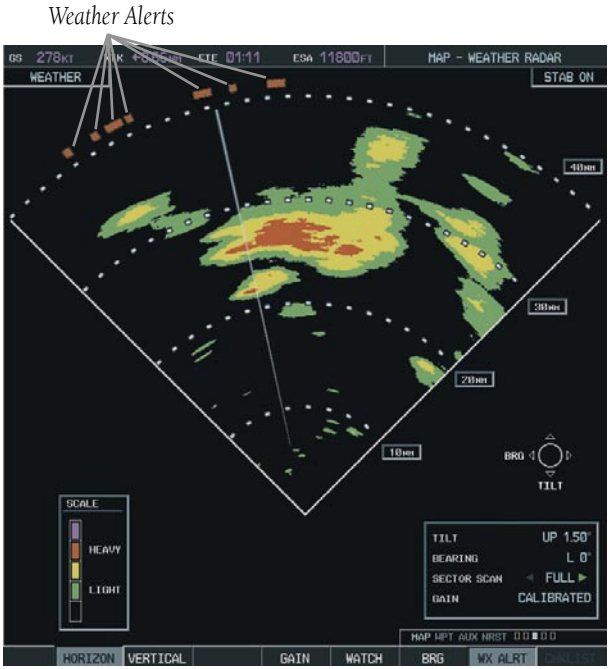


Figure 10-46 Weather Alert Indications

To activate or deactivate Weather Alerts, select the **WX ALRT** Softkey. Activating and deactivating also enables or inhibits the alert on the PFD.

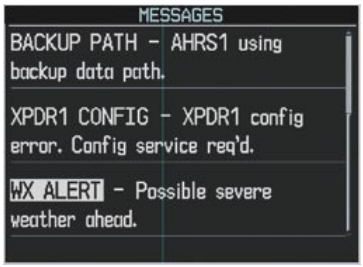

MESSAGES
BACKUP PATH - AHRS1 using backup data path.
XPDR1 CONFIG - XPDR1 config error. Config service req'd.
WX ALERT - Possible severe weather ahead.

Figure 10-47 Weather Alert on PFD

Ground Mapping and Interpretation

A secondary use of the weather radar system is for the presentation of terrain. This can be a useful tool for verifying aircraft position. A "picture" of the ground is represented much like a topographical map that can be used as a supplement to the navigation map on the MFD.

Ground Map mode uses a different gain range than Weather mode. Different colors are also used to represent the intensity levels. The displayed intensity of ground target returns are defined in Figure 10-48. Use of the **GAIN** and **TILT** controls help improve contrast so that specific ground targets can be recognized more easily. As previously discussed, the type and orientation of the target in relation to the aircraft affects the intensity displayed.

When the weather radar system is in the either the Weather or Ground Map mode, the system automatically switches to Standby mode.

Ground Map Mode Color	Intensity
BLACK	0 dB
LIGHT BLUE	> 0 dB to < 9 dB
YELLOW	9 dB to < 18 dB
MAGENTA	18 dB to < 27 dB
BLUE	27 dB and greater

Figure 10-48 Ground Target Return Intensity Levels

Operation in Ground Map Mode

1) Select the **MODE** Softkey.
2) Select the **GROUND** Softkey to place the radar in Ground Map mode.
3) Select the **BACK** Softkey.
4) Press the **FMS** Knob to activate the cursor.
5) Turn the large **FMS** Knob to place the cursor in the TILT field.
6) Adjust the antenna tilt angle by turning the small **FMS** Knob to display ground returns at the desired distance.
7) Press the **FMS** Knob to remove the cursor.

Blank Page

SECTION 11: ADDITIONAL FEATURES

11.1 SAFETAXI

When the map range is decreased to level sufficient to view airport detail, runways with numbers, taxiways with identifying letters/numbers, airport Hot Spots, and airport landmarks including ramps, buildings, control towers, and other prominent features are shown. When the aircraft location is within the screen boundary an airplane symbol is shown for enhanced position awareness.

During ground operations the aircraft's position is displayed in reference to taxiways, runways, and airport features. In the example shown, the aircraft is on taxiway Bravo inside the High Alert Intersection boundary on KSFO airport. Airport Hot Spots are outlined in magenta. When panning over the airport, features such as runway holding lines and taxiways are shown at the cursor.

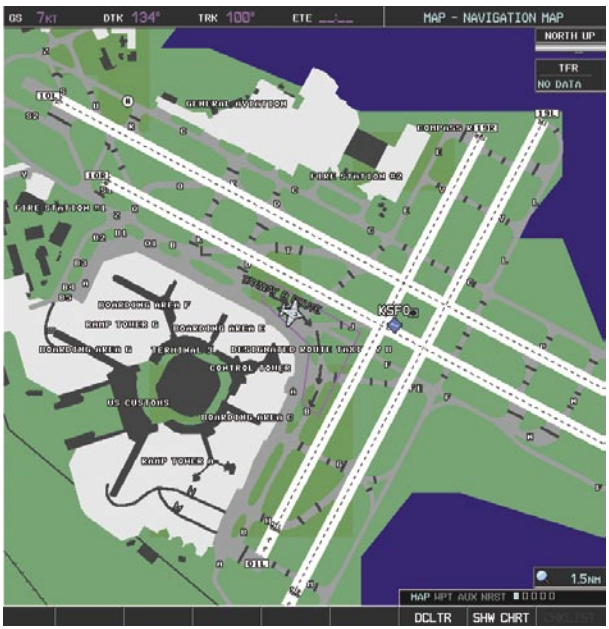


Figure 11-1 SafeTaxi Depiction on the Navigation Map Page

The SafeTaxi database is revised every 56 days. SafeTaxi is always available for use after the expiration date. When turning on the G1000, the Power-up Page indicates whether the databases are current, out of date, or not available. The Power-up Page shows the SafeTaxi database is current when the SafeTaxi Expires date is shown in white. When the SafeTaxi cycle has expired, the SafeTaxi Expires date appears in yellow. The message SafeTaxi: N/A appears in white if no SafeTaxi data is available on the database card.

Selecting the **DCLTR** Softkey removes the taxiway markings and airport identification labels. Selecting the **DCLTR-1** Softkey removes VOR station ID, the VOR symbol, and intersection names if within the airport plan view. Selecting the **DCLTR-2** Softkey removes the airport runway layout, unless the airport in view is part of an active route structure. Selecting the **DCLTR-3** Softkey cycles back to the original map detail.

Configuring SafeTaxi Range

1) While viewing the Navigation Map Page, press the **MENU** Key to display the PAGE MENU.
2) Turn the large **FMS** Knob to highlight the Map Setup Menu Option and press the **ENT** Key.

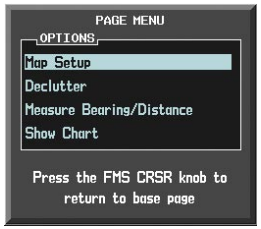


Figure 11-2 Navigation Map PAGE MENU, Map Setup Option

3) Turn the **FMS** Knob to select the Aviation Group and press the **ENT** Key.

Figure 11-3 Selecting the Aviation Group

4) Turn the large **FMS** Knob to scroll through the Aviation Group options to SAFETAXI.

5) Turn the small **FMS** Knob to display the range of distances.

6) Turn either **FMS** Knob to select the desired distance for maximum SafeTaxi display range.

7) Press the **ENT** Key to complete the selection.

8) Press the **FMS** Knob to return to the Navigation Map Page.

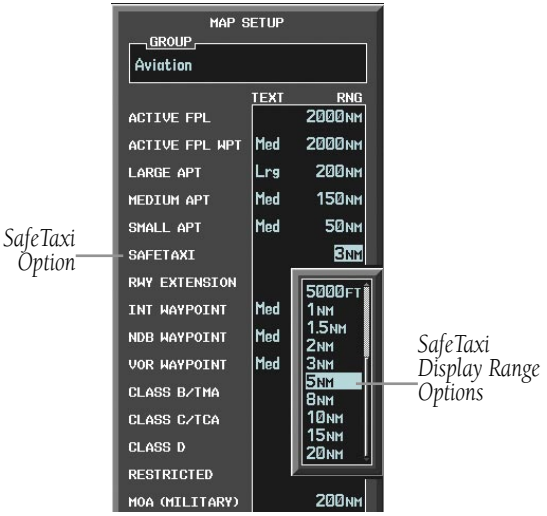


Figure 11-4 SafeTaxi Display Range Options

11.2 TERMINAL PROCEDURE CHARTS (OPTIONAL)

The ChartView database is revised every 14 days. Charts are still viewable during a period that extends from the cycle expiration date to the disables date. ChartView is disabled 70 days after the expiration date and is no longer available for viewing.

FliteCharts data is revised every 28 days. Charts are still viewable during a period that extends from the cycle expiration date to the disables date. FliteCharts is disabled 180 days after the expiration date and are no longer available for viewing.

While on the Navigation Map Page, Flight Plan Page, or Nearest Airports Page, selecting the **SHW CHRT** Softkey displays the available terminal chart. The available softkeys are shown in Figure 11-5.

Selecting the **GO BACK** Softkey reverts to the top level softkeys and previous page.

When no terminal procedure chart is available, the banner CHART NOT AVAILABLE appears on the screen. The CHART NOT AVAILABLE banner does not refer to the Jeppesen subscription, but rather the availability of a particular airport chart selection or procedure for a selected airport.

If there is a problem in rendering the data (such as a data error or a failure of an individual chart), the banner UNABLE TO DISPLAY CHART is then displayed.

Chart Selection

1) While viewing the Navigation Map Page, Flight Plan Page, or Nearest Airports Page, select the **SHW CHRT** Softkey. The airport diagram or approach chart is displayed on the Airport Information Page.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to select the Airport Identifier Box if another diagram is desired. If desired chart is already displayed, go to step 6.

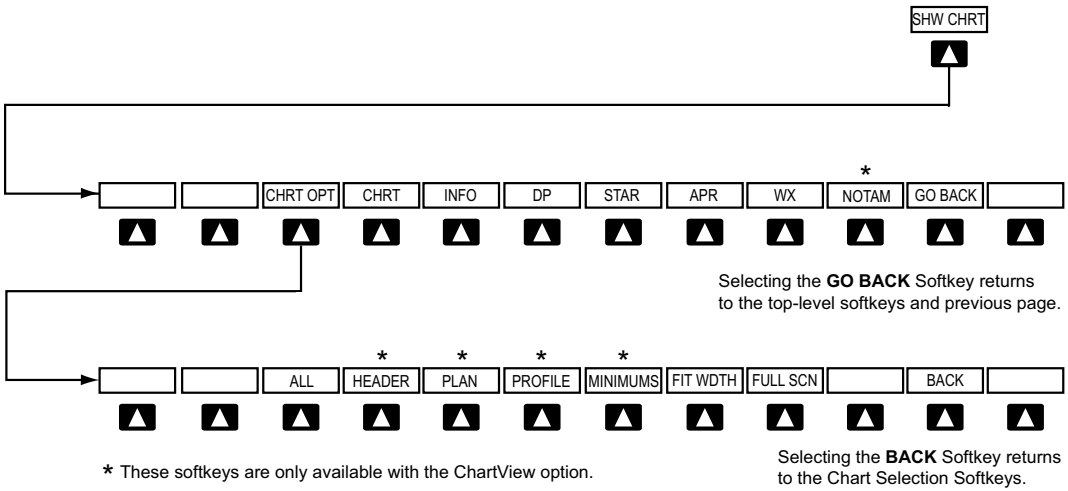


Figure 11-5 ChartView Softkeys

4) Turn the small and large **FMS** Knob to enter the desired airport identifier.

5) Press the **ENT** Key.

6) Turn the large **FMS** Knob to select the Approach Box.

7) Turn the small **FMS** Knob to show the approach chart selection choices.

8) Turn either **FMS** Knob to scroll through the available charts.

9) With the desired chart displayed, press the **ENT** Key.

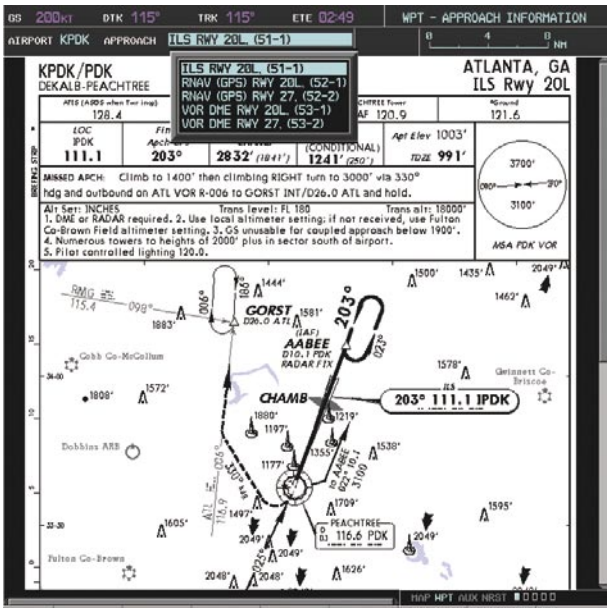


Figure 11-6 Chart Selection on the Approach Information Page (ChartView shown)

The aircraft symbol is shown on the chart only if the chart is to scale and the aircraft position is within the boundaries of the chart. The aircraft symbol is not displayed when the Aircraft Not Shown Icon appears (Figure 11-7). If the Chart Scale Box displays a banner CHART NOT TO SCALE, the aircraft symbol is not shown.

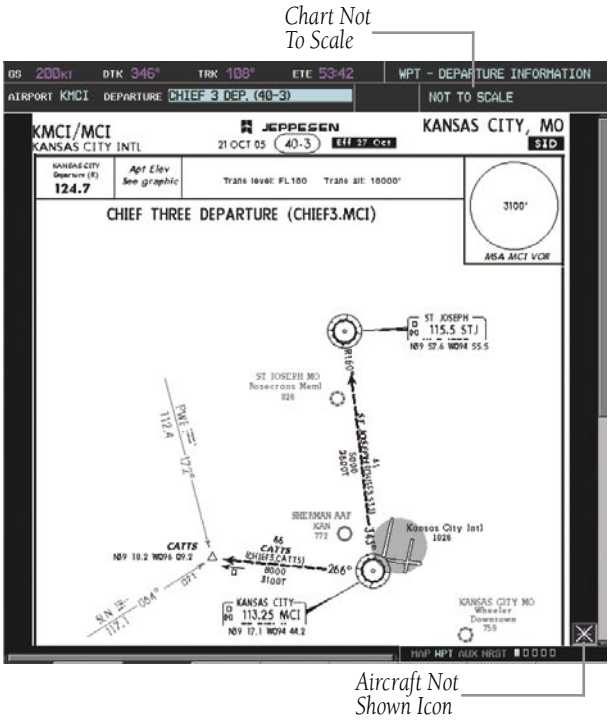


Figure 11-7 Chart Not to Scale (ChartView shown)

Chart Options

FliteCharts

Selecting the **CHRT OPT** Softkey displays the next level of softkeys.

Selecting the **ALL** Softkey shows the entire chart on the screen.

Selecting the **FIT WIDTH** Softkey fits the width of the chart in the display viewing area.

Selecting the **FULL SCN** Softkey removes the data window displays the chart in a larger viewing area.

ChartView

Selecting the **CHRT OPT** Softkey displays the next level of softkeys.

Selecting the **ALL** Softkey shows the entire chart on the screen.

Selecting the **HEADER** Softkey shows the header view (approach chart briefing strip) on the screen as seen in Figure 11-8.

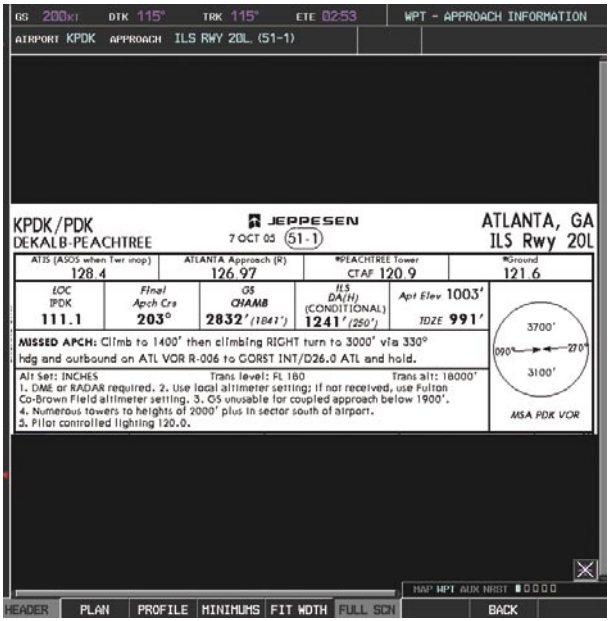

GS 200KT DTK 115° TRK 115° ETE 02:53
WPT – APPROACH INFORMATION
AIRPORT KPDK APPROACH ILS RWY 20L (51-1)
KPDK/PDK
DEKALB-PEACHTREE
JEPPESEN
7 OCT 05 (51-1)
ATLANTA, GA
ILS Rwy 20L
ATIS (ASOS when Twr shop) 128.4
ATLANTA Approach (R) 126.97
PEACHTREE Tower CTAF 120.9
Ground 121.6
LOC IPDK 111.1
Final Apch Crs 203°
GS CHAMB 2832' (1841')
ILS DA(H) (CONDITIONAL) 1241' (250')
Apt Elev 1003'
TDZE 991'
MISSED APCH: Climb to 1400' then climbing RIGHT turn to 3000' via 330° hdg and outbound on ATL VOR R-006 to GORST INT/D26.0 ATL and hold.
Alt Set: INCHES
Trans level: FL 180
Trans alt: 18000'
1. DME or RADAR required. 2. Use local altimeter setting; if not received, use Fulton Co-Brown Field altimeter setting. 3. GS unusable for coupled approach below 1900'.
4. Numerous towers to heights of 2000' plus in sector south of airport.
5. Pilot controlled lighting 120.0.
3700'
3100'
MSA PDK VOR
HEADER PLAN PROFILE MINIMUMS FIT WDTH FULL SCN BACK

Figure 11-8 Header View

Selecting the **PLAN** Softkey shows the approach chart two dimensional plan view.

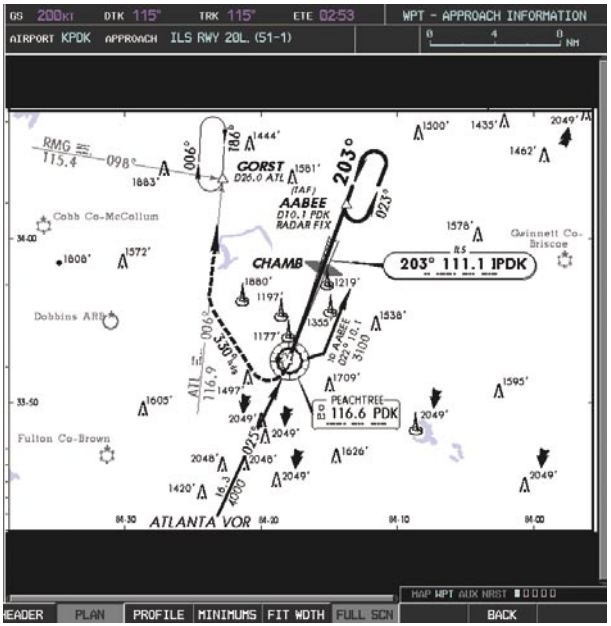


Figure 11-9 Plan View

Selecting the **PROFILE** Softkey displays the approach chart descent profile strip.

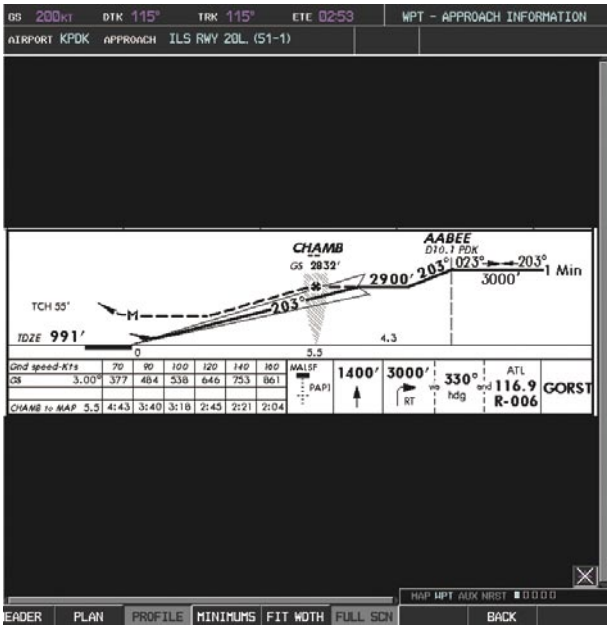


Figure 11-10 Profile View

Selecting the **MINIMUMS** Softkey displays the minimum descent altitude/visibility strip at the bottom of the approach chart.

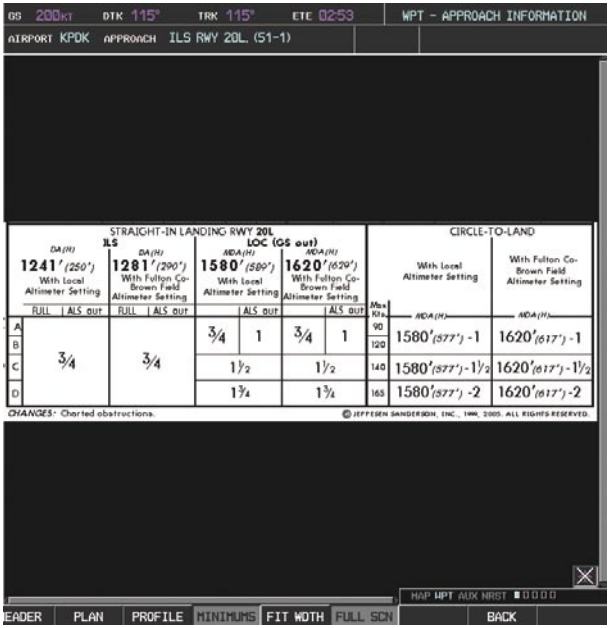

GS 200KT DTK 115° TRK 115° ETE 02:53
WPT - APPROACH INFORMATION
AIRPORT KPDK APPROACH ILS RWY 20L (S1-1)
STRAIGHT-IN LANDING RWY 20L
CIRCLE-TO-LAND
ILS
LOC (GS out)
1241'(250') With Local Altimeter Setting
1281'(290') With Fulton Co-Brown Field Altimeter Setting
1580'(580') With Local Altimeter Setting
1620'(620') With Fulton Co-Brown Field Altimeter Setting
With Local Altimeter Setting
With Fulton Co-Brown Field Altimeter Setting
1580'(577') -1
1620'(617') -1
1580'(577') -1½
1620'(617') -1½
1580'(577') -2
1620'(617') -2
CHANGES: Charted obstructions.
© JEPPESEN SANDERSON, INC., 1998, 2005. ALL RIGHTS RESERVED.
MAP WPT AUX NRST
HEADER PLAN PROFILE MINIMUMS FIT WDTH FULL SCN BACK

Figure 11-11 Minimums View

If the chart scale has been adjusted to view a small area of the chart, selecting the **FIT WIDTH** Softkey changes the chart size to fit the available screen width.

Selecting the **FULL SCN** Softkey removes the data window displays the chart in a larger viewing area.

Day/Night View Selection

1) While viewing a terminal chart, press the **MENU** Key to display the Page Menu OPTIONS.
2) Turn the large **FMS** Knob to highlight the Chart Setup Menu Option, then press the **ENT** Key.

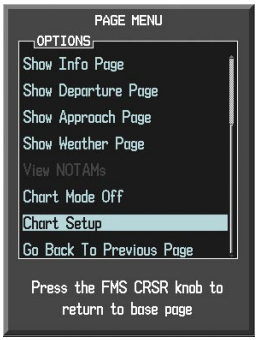


Figure 11-12 Options Menu

3) Turn the large **FMS** Knob to move the cursor to the COLOR SCHEME Options (Figure 11-13).

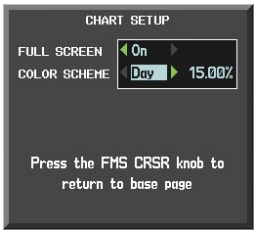


Figure 11-13 Chart Setup Selection

4) Turn the small **FMS** Knob to choose between Day, Auto, and Night Options.
5) If Auto Mode is selected, turn the large **FMS** Knob to select the percentage field. Use the small **FMS** Knob to change the percentage value. The percentage value is the day/night crossover point based on the percentage of backlighting intensity. For example, if the value is set to 15%, the day/night display changes when the display backlight reaches 15% of full brightness.

   The display must be changed in order for the new setting to become active. This may be accomplished by selecting another page or changing the display range.

11.3 XM RADIO (OPTIONAL)

XM Satellite Radio services are subscription-based. For more information on specific service packages, visit www.xmradio.com.

Activating XM Satellite Radio Services

The service is activated by providing XM Satellite Radio with either one or two coded IDs, depending on the equipment. Either the Audio Radio ID or the Data Radio ID, or both, must be provided to XM Satellite Radio to activate the entertainment subscription.

XM Satellite Weather and XM Satellite Radio may be activated independently of one another. XM Satellite Radio uses one or both of the coded IDs to send an activation signal that, when received by the GDL 69A, allows it to play entertainment programming.

NOTE: *The **LOCK** Softkey on the XM Information Page (Auxiliary Page Group) is used to save GDL 69A activation data when the XM services are initially set up. It is not used during normal XM Radio operation, but there should be no adverse effects if inadvertently selected during flight. Refer to the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04, Rev F or later) for further information.*

1) Contact XM WX Satellite Radio through the email address listed on their website (www.xmradio.com) or by the customer service phone number listed on the website. Follow the instructions provided by XM Satellite Radio services.
2) Select the Auxiliary Page Group.
3) Select the next to last page in the AUX Page Group.
4) If necessary, select the **INFO** Softkey to display the XM Information Page.
5) Verify that the desired services are activated.
6) Select the **LOCK** Softkey.
7) Turn the large **FMS** Knob to highlight YES.
8) To complete activation, press the **ENT** Key.

Figure 11-14 XM Information Page

If XM weather services have not been activated, the boxes next to each listed weather product are unfilled. A yellow "Activation Required" message is also displayed in the center of the Weather Data Link Page.

Using XM Radio

The XM Radio Page provides information and control of the audio entertainment features of the XM Satellite Radio.

The Active Channel displays the currently selected channel that the XM Radio is using.

The Channel List shows a list of the available channels for the selected category. Channels can be stepped through one at a time or may be selected directly by channel number.

1) Turn the large **FMS** Knob to select the Auxiliary Page Group.
2) Turn the small **FMS** Knob to select the displayed AUX - XM Information Page.
3) Select the **RADIO** Softkey to show the XM Radio Page.

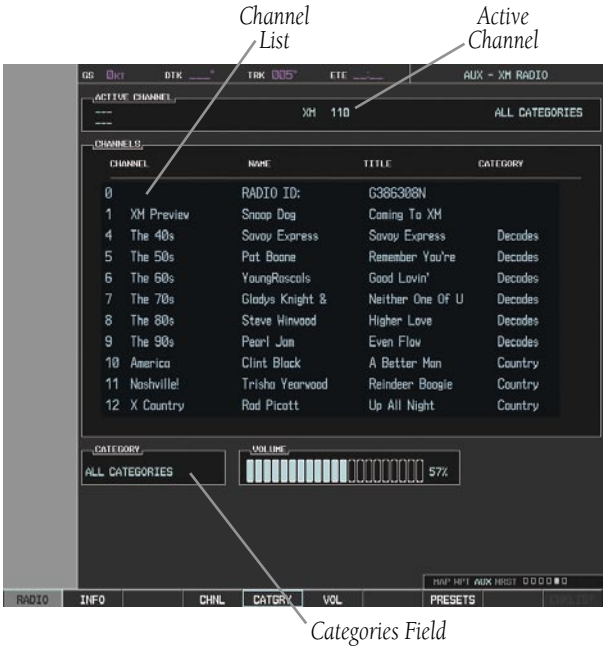


Figure 11-15 XM Radio Page

Selecting a Channel from the Channel List

1) While on the XM Radio Page, select the CHNL Softkey.
2) Select the **CH +** Softkey to go up through the list in the Channel Box, or move down the list with the **CH –** Softkey.

Or:

1) Press the **FMS** Knob to highlight the channel list and turn the large **FMS** Knob to scroll through the channels.
2) Press the **ENT** Key to activate the selected channel.

Selecting a Channel Directly

1) While on the XM Radio Page, select the **CHNL** Softkey.
2) Select the **DIR CH** Softkey. The channel number in the Active Channel Box is highlighted.
3) Select the numbered softkeys located on the bottom of the display to directly select the desired channel number.
4) Press the **ENT** Key to activate the selected channel.

Selecting a Category

The Category Box of the XM Radio Page displays the currently selected category of audio. Categories of channels, such as jazz, rock, or news can be selected to list only the available channels in that category. One of the optional categories is PRESETS. This is a category of channels that may be programmed by the user.

1) Select the **CATGRY** Softkey on the XM Radio Page.
2) Select the **CAT +** and **CAT -** Softkeys to cycle through the categories.

Or:

Turn the small **FMS** Knob to display the Categories list. Highlight the desired category with the small **FMS** Knob and press the **ENT** Key. Selecting All Categories places all channels in the list.

Figure 11-16 Categories List

Creating Presets

Up to 15 channels from any category can be assigned a preset number. The preset channels are selected by selecting the **PRESETS** and **MORE** Softkeys. Then the preset channel can be selected directly and added to the channel list for the Presets category.

1) On the XM Radio Page, while listening to an Active Channel that is wanted for a preset, select the **PRESETS** Softkey to access the first five preset channels (**PS1 - PS5**).
2) Select the **MORE** Softkey to access the next five channels (**PS6 – PS10**), and again to access the last five channels (**PS11 – PS15**). Selecting the **MORE** Softkey repeatedly cycles through the preset channels.
3) Select any one of the (**PS1 - PS15**) softkeys to assign a number to the active channel.
4) Select the **SET** Softkey on the desired channel number to save the channel as a preset.

Selecting the **BACK** Softkey returns the system to the top level softkeys.

Adjusting Volume

Radio volume is shown as a percentage. Volume level is controlled by selecting the **VOL** Softkey, which brings up the **MUTE** Softkey and the volume increase and decrease softkeys.

1) With the XM Radio Page displayed, select the **VOL** Softkey.
2) Select the **VOL –** Softkey to reduce volume or select the **VOL +** Softkey to increase volume. (Once the **VOL** Softkey is selected, the volume can also be adjusted using the small **FMS** Knob.)
3) Select the **MUTE** Softkey to mute the audio. Select the **MUTE** Softkey again to restore the audio.

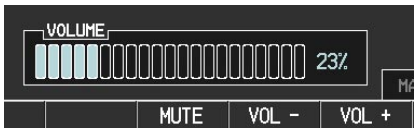


Figure 11-18 Volume Control

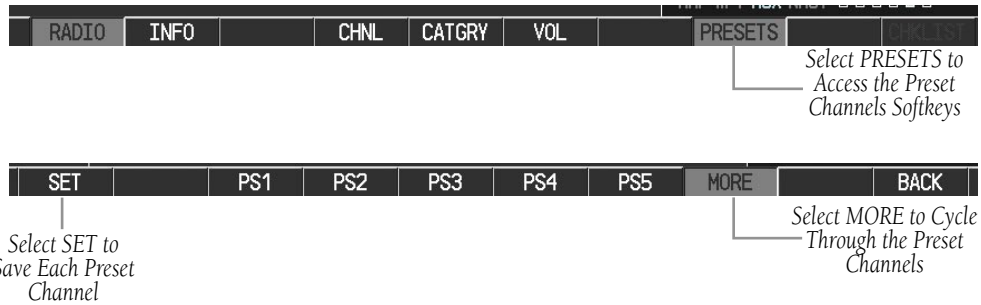


Figure 11-17 Accessing and Selecting XM Preset Channels

Data Link Receiver Error Messages

Message	Message Location	Description
CHECK ANTENNA	XM Radio Page - active channel field	Data Link Receiver antenna error; service required
UPDATING	XM Radio Page - active channel field	Data Link Receiver updating encryption code
NO SIGNAL	XM Radio Page - active channel field Weather Datalink Page - center of page	Loss of signal; signal strength too low for receiver
LOADING	XM Radio Page - active channel field	Acquiring channel audio or information
OFF AIR	XM Radio Page - active channel field	Channel not in service
---	XM Radio Page - active channel field	Missing channel information
WEATHER DATA LINK FAILURE	Weather Datalink Page - center of page	No communication from Data Link Receiver within last 5 minutes
ACTIVATION REQUIRED	Weather Datalink Page - center of page	XM subscription is not activated

11.4 SCHEDULER

The Scheduler feature can be used to enter and display reminder messages (e.g., Hot Section Inspection or Phase 1 Maintenance Check) in the Alerts Window on the PFD. Messages can be set to display based on a specific date and time (event), once the message timer reaches zero (one-time; default setting), or recurrently whenever the message timer reaches zero (periodic). Message timers set to periodic alerting automatically reset to the original timer value once the message is displayed. When power is cycled, messages are retained until deleted, and message timer countdown is restarted.

Entering a Scheduler Message

1) Select the AUX - Utility Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the first empty scheduler message naming field.
4) Use the **FMS** Knob to enter the message text to be displayed in the Alerts Window and press the **ENT** Key.
5) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the field next to Type.
6) Turn the small **FMS** Knob to select the message alert type:
   - Event—Message issued at the specified date/time
   - One-time—Message issued when the message timer reaches zero (default setting)
   - Periodic—Message issued each time the message timer reaches zero
7) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the next field.
8) For periodic and one-time message, use the **FMS** Knob to enter the timer value (HH:MM:SS) from which to countdown and press the **ENT** Key.

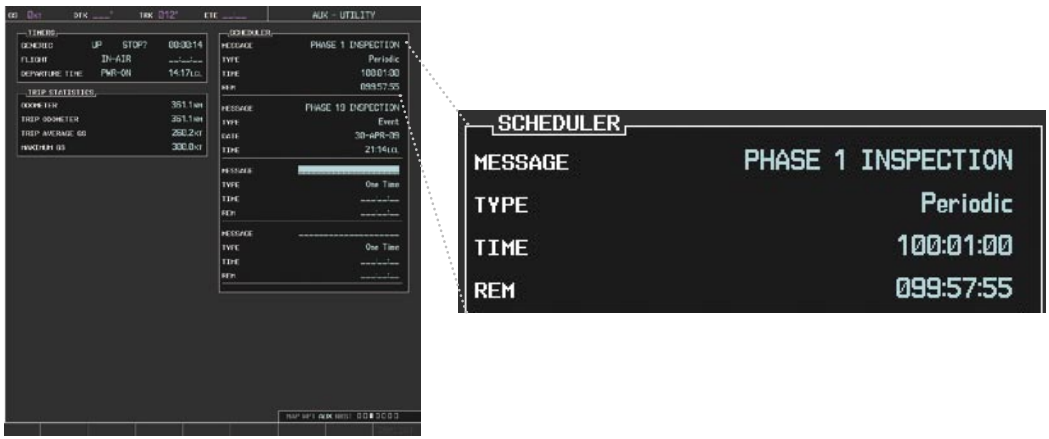


Figure 11-19 Scheduler (Utility Page)

9) For event-based messages:
   a) Use the **FMS** Knob to enter the desired date (DD-MM-YY) and press the **ENT** Key.
   b) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to the next field.
   c) Use the **FMS** Knob to enter the desired time (HH:MM) and press the **ENT** Key.
10) Press the **ENT** Key again or use the large **FMS** Knob to move the cursor to enter the next message.

Deleting a Scheduler Message

1) Select the AUX - Utility Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the name field of the scheduler message to be deleted.
4) Press the **CLR** Key to clear the message text. If the **CLR** Key is pressed again, the message is restored.
5) Press the **ENT** Key to confirm message deletion.

Scheduler messages appear in the Alerts Window on the PFD and cause the **ALERTS** Softkey label to change to ADVISORY. Selecting the **ADVISORY** Softkey opens the Alerts Window and acknowledges the scheduler message. The softkey revers to the ALERTS label and when selected, the Alerts Window is removed from the display and the scheduler message is deleted from the message queue.

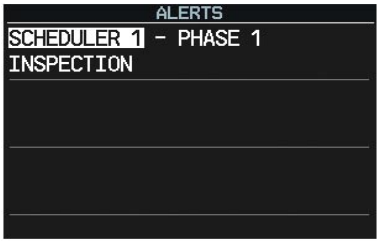


Figure 11-20 PFD Alerts Window

SECTION 12: ABNORMAL OPERATION

12.1 REVERSIONARY MODE

Reversionary Mode is a mode of operation in which all important flight information is presented on at least one of the remaining displays. Flight parameters are presented in the same format as in normal mode.

Reversionary display mode is manually activated by:

1) **PFD1** – By pressing the **DISPLAY BACKUP** button on the left audio panel.
2) **MFD** – By pressing the **DISPLAY BACKUP** button on the left or the right audio panel.
3) **PFD2** – By pressing the **DISPLAY BACKUP** button on the right audio panel.

12.2 ABNORMAL COM OPERATION

When a COM tuning failure is detected by the system, the emergency frequency (121.500 MHz) is automatically loaded into the active frequency field of the COM radio for which the tuning failure was detected. In the event of a dual display failure, the emergency frequency (121.500 MHz) automatically becomes the active frequency to the pilot through the pilot headset.

Normal Operation

Figure 12-1 G1000 Reversionary Mode: Failed PFD1

12.3 UNUSUAL ATTITUDES

The PFD 'declutters' when the aircraft enters an unusual attitude. Only the primary functions are displayed in these situations.

The following information is removed from the PFD (and corresponding softkeys are disabled) when pitch exceeds +30°/-20° or bank exceeds 65°:

- Traffic Annunciations
- Flight director Command Bars
- Inset Map
- Temperatures
- DME Information Window
- Wind Data
- Selected Heading Box
- Selected Course Box
- Transponder Status Box
- System Time
- PFD Setup Menu
- Windows displayed in the lower right corner of the PFD:
  - Timer/References
  - Nearest Airports
  - Flight Plan
  - Messages
  - Procedures
- Barometric Minimum Descent Altitude Box
- Glideslope, Glidepath, and Vertical Deviation Indicators
- Altimeter Barometric Setting
- Selected Altitude
- VNV Target Altitude

Red extreme pitch warning chevrons pointing toward the horizon are displayed starting at 50 degrees above and 30 degrees below the horizon line.

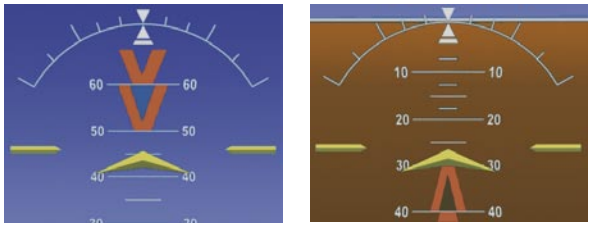


Figure 12-2 Extreme Pitch Indication

12.4 STORMSCOPE OPERATION WITH LOSS OF HEADING INPUT

If heading is lost, strikes and/or cells must be cleared manually after the execution of each turn. This is to ensure that the strike and/or cell positions are depicted accurately in relation to the nose of the aircraft.

12.5 HAZARD DISPLAYS WITH LOSS OF GPS POSITION

If GPS position is lost, or becomes invalid, selected hazards being displayed on the Navigation Map Page are removed until GPS position is again established. The icons in the lower right of the screen, indicating the selected functions for display, now show an 'X', as shown in Figure 12-3.

Figure 12-3 Loss of Hazard Functions with Loss of GPS Position

12.6 DEAD RECKONING

WARNING: *DR Mode is inherently less accurate than the standard GPS/WAAS Mode due to the lack of satellite measurements needed to determine a position. Changes in wind speed and/or wind direction compound the relative inaccuracy of DR Mode. Because of this degraded accuracy, the crew must maintain position awareness using other navigation equipment until GPS-derived position data is restored.*

While in Enroute or Oceanic phase of flight, if the G1000 detects an invalid GPS solution or is unable to calculate a GPS position, the system automatically reverts to Dead Reckoning (DR) Mode. In DR Mode, the G1000

uses its last-known position combined with continuously updated airspeed and heading data (when available) to calculate and display the aircraft's current estimated position.

***NOTE:** Dead Reckoning Mode only functions in Enroute (ENR) or Oceanic (OCN) phase of flight. In all other phases, an invalid GPS solution produces a "NO GPS POSITION" annunciation on the map and the G1000 stops navigating in GPS Mode.*

DR Mode is indicated on the G1000 by the appearance of the letters 'DR' superimposed in yellow over the 'own aircraft' symbol as shown in Figure 12-4. In addition, 'DR' is prominently displayed, also in yellow, on the HSI slightly above and to the right of the aircraft symbol on the CDI as shown in Figure 12-4. Also, the CDI deviation bar is removed from the display. Lastly, but at the same time, a 'GPS NAV LOST' alert message appears on the PFD.

Normal navigation using GPS/WAAS source data will resume automatically once a valid GPS solution is restored.

It is important to note that estimated navigation data supplied by the G1000 in DR Mode may become increasingly unreliable and must not be used as a sole means of navigation. If, while in DR Mode, airspeed and/or heading data is also lost or not available, the DR function may not be capable of accurately tracking your estimated position and, consequently, the system may display a path that is different than the actual movement of the aircraft. Estimated position information displayed by the G1000 through DR while there is no heading and/or airspeed data available should not be used for navigation.

CDI 'DR' Indication on PFD

Symbolic Aircraft (Map pages and Inset Map)

Figure 12-4 Dead Reckoning Indications

As a result of operating in DR Mode, all GPS-derived data is computed based upon an estimated position and is displayed as yellow text on the display to denote degraded navigation source information. This data includes the following:

- Navigation Status Box fields except Active Leg, TAS, and DTK
- GPS Bearing Pointer
- Wind data and pointers in the Wind Data Box on the PFD and MFD
- Track Bug
- All Bearing Pointer Distances
- Active Flight Plan distances, bearings, and ETE values

Also, while the G1000 is in DR Mode, the autopilot will not couple to GPS, and both TAWS and Terrain Proximity is disabled. Additionally, the accuracy of all nearest information (airports, airspaces, and waypoints) is questionable. Finally, airspace alerts continue to function, but with degraded accuracy.

Blank Page

SECTION 13: ANNUNCIATIONS & ALERTS

13.1 CAS MESSAGES

Warning Messages

When a new red CAS warning message appears, it flashes (inversely red on white) in conjunction with the Master Warning Indicator. Pressing the Master Warning Indicator acknowledges all flashing red messages, extinguishing the master warning lights, and stops warning message flashing. Once acknowledged, CAS warning messages are shown in red text and are displayed until the issue is corrected.

Messages	Comments	Inhibits					
		ENGINE OFF	ENGINE ON	GROUND	TOPI	AIR	LOPI
BAT OVERHEAT	Battery temperature over 70°C						
BLEED TEMP	Bleed temperature high	X			X		
CABIN ALTITUDE	Cabin altitude over 10,000 ft			X			
CABIN DIFF PRESS	Cabin pressure differential over 6.2 psi	X					
DOOR	Pilot or cabin door open						
FIRE	Engine compartment fire (temperature over 200°C; if installed)						
FLAPS ASYM	Dissymmetry between left- and right-hand flaps						
FUEL OFF	Fuel tank selectors set to "Off"						
FUEL PRESS	Fuel pressure below 10 psi						
ITT	Engine start: ITT over 1000°C, 870°C (5 s), or 840°C (20 s) Engine running: ITT over 840°C						
OIL PRESS	Oil pressure below 60 psi						
OXYGEN	Oxygen cylinder closed						
PARK BRAKE	Parking brake applied						
TORQUE	Torque greater than or equal to 124.5% maximum torque						

Caution Messages

When a new yellow caution message appears on the CAS display, it flashes (inversely black on yellow). The Master Caution Indicator is also illuminated. Pressing the Master Caution Indicator acknowledges all flashing yellow messages, extinguishing the master caution lights, and stops caution message flashing. Messages are displayed until the issue is corrected.

Messages	Comments	Inhibits					
		ENGINE OFF	ENGINE ON	GROUND	TOPI	AIR	LOPI
AUTO SEL	Fuel timer off or out of service				X		
AUX BOOST PMP ON	Electric fuel pump running (manual or automatic mode)						
BAT AMP	Battery current over 50 A while on ground				X	X	X
BAT OFF	Battery off				X		
BLEED OFF	Flow control and shut-off valve/shut-off valve closed	X			X		X
CHIP	Oil chip detector on (if installed)				X		X
FRONT CARGO DOOR	Forward baggage door open				X		
FUEL IMBALANCE	Fuel tanks imbalanced by more than 15 USGAL for >30 seconds						
FUEL LOW L-R*	Fuel quantity less than or equal to 9.1 USGAL in specified tank						
GPU DOOR	GPU receptacle door not closed				X		X
IGNITION	Ignition exciter running						
INERT SEP FAIL	Inertial separator failure	X			X		
INERT SEP ON	Inertial separator extended						
LOW LVL FAIL L-R*	Low fuel level sensor failure for specified tank						
LOW VOLTAGE	Battery voltage below 26 V				X		X
MAIN GEN	Starter generator unconnected	X			X		
OIL PRESS	Oil pressure between 60 and 100 psi	X					
OIL TEMP	Oil temperature below 0°C or above 104°C				X		
PITOT HT ON L-R*	Specified pitot heat (left or right) on while engine off		X				
PITOT NO HT L-R*	Specified pitot heat (left or right) off	X					
PROP DEICE FAIL	Prop deice selected and not on	X			X		
PROP DEICE ON	Prop deice on while engine off		X				
REAR CARGO DOOR	Rear cargo door open				X		

Messages	Comments	Inhibits					
		ENGINE OFF	ENGINE ON	GROUND	TOPI	AIR	LOPI
STALL HEAT ON	Stall warning heat on while engine off		X				
STALL NO HEAT	Stall warning heat off	X					
STARTER	Starter generator running						
VACUUM LOW	Vacuum pressure less than 3.75 in Hg	X			X		

** Only affected side (L, R, or L-R) displayed in CAS message; applicable messages listed here display L-R for example*

Inhibits prevent certain CAS messages from being displayed during the following conditions:

- Engine off
- Engine on
- Aircraft on ground (Ground)
- Takeoff Operation Phase Inhibit (TOPI)
- Aircraft in air (AIR)
- Landing Operation Phase Inhibit (LOPI)

13.2 COMPARATOR ANNUNCIATIONS

Comparator Window Text	Condition
ALT MISCOMP	Difference in altitude sensors is ≥ 200 ft.
IAS MISCOMP	If both airspeed sensors detect < 35 knots, this is inhibited.
	If either airspeed sensor detects ≥ 35 knots, and the difference in sensors is > 10 kts.
	If either airspeed sensor detects ≥ 80 knots, and the difference in sensors is > 7 kts.
HDG MISCOMP	Difference in heading sensors is > 6 degrees.
PIT MISCOMP	Difference in pitch sensors is > 5 degrees.
ROLL MISCOMP	Difference in roll sensors is > 6 degrees.
ALT NO COMP	No data from one or both altitude sensors.
IAS NO COMP	No data from one or both airspeed sensors.
HDG NO COMP	No data from one or both heading sensors.
PIT NO COMP	No data from one or both pitch sensors.
ROLL NO COMP	No data from one or both roll sensors..

13.3 REVERSIONARY SENSOR ANNUNCIATIONS

Reversionary Sensor Window Text	Condition
BOTH ON ADC1	Both PFDs are displaying data from the number one Air Data Computer.
BOTH ON ADC2	Both PFDs are displaying data from the number two Air Data Computer.
BOTH ON AHRS1	Both PFDs are displaying data from the number one Attitude & Heading Reference System.
BOTH ON AHRS2	Both PFDs are displaying data from the number two Attitude & Heading Reference System.
BOTH ON GPS1	Both PFDs are displaying data from the number one GPS receiver.
BOTH ON GPS2	Both PFDs are displaying data from the number two GPS receiver.
XSIDE ADC	The PFD displaying this annunciation is displaying data from the cross-side Air Data Computer.
XSIDE AHRS	The PFD displaying this annunciation is displaying data from the cross-side Attitude & Heading Reference System.

13.4 TAWS ALERTS

Annunciations appear on the PFD and MFD. Pop-up alerts appear only on the MFD.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Map Page Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" or "Obstacle, Obstacle; Pull Up, Pull Up"

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Map Page Pop-Up Alert	Aural Message
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION – TERRAIN or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD or CAUTION – TERRAIN	"Terrain Ahead; Terrain Ahead" or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION – OBSTACLE or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD or CAUTION – OBSTACLE	"Obstacle Ahead; Obstacle Ahead" or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW – TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK or TOO LOW – TERRAIN	"Don't Sink" or "Too Low, Terrain"

TAWS System Status Annunciations

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available" "TAWS Available" will be heard when sufficient GPS signal is re-established.
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

13.5 OTHER G1000 AURAL ALERTS

Aural Alert	Description
"Minimums, minimums"	The aircraft has descended below the preset barometric minimum descent altitude.
"Vertical track"	The aircraft is one minute from Top of Descent. Issued only when vertical navigation is enabled.
"Traffic"	The Traffic Information Service (TIS) has issued a Traffic Advisory alert
"Traffic not available"	The aircraft is outside the Traffic Information Service (TIS) coverage area.

13.6 G1000 SYSTEM MESSAGE/FAILURE ANNUNCIATIONS

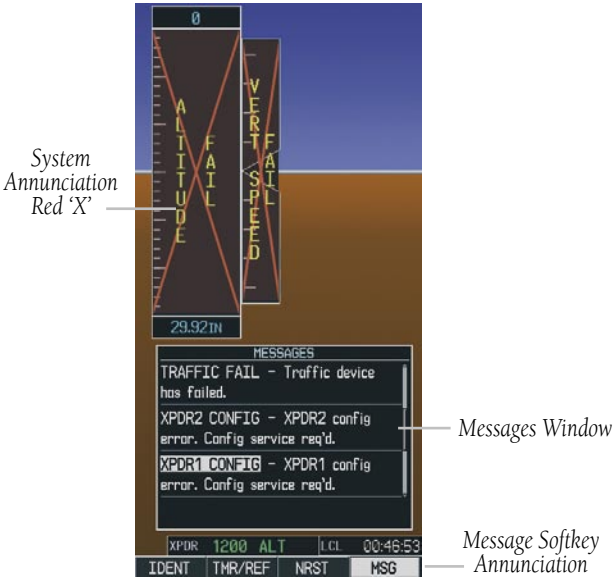

System Annunciation Red 'X'
ALTITUDE FAIL
VERT SPEED FAIL
29.92IN
MESSAGES
TRAFFIC FAIL - Traffic device has failed.
XPDR2 CONFIG - XPDR2 config error. Config service req'd.
XPDR1 CONFIG - XPDR1 config error. Config service req'd.
Messages Window
XPDR 1200 ALT LCL 00:46:53
IDENT TMR/REF NRST MSG
Message Softkey Annunciation

Figure 13-1 G1000 System Messages

This section describes various G1000 system message advisories. Certain messages are issued due to an LRU or an LRU function failure. When a message is issued, the **MSG** Softkey flashes. Selecting the **MSG** Softkey to view the message in the Message Window. Such messages are normally accompanied by a corresponding red 'X' annunciation as shown previously in the G1000 System Annunciation section.

NOTE: *This section provides information regarding G1000 message advisories that may be displayed by the system. Knowledge of the aircraft, systems, flight conditions, and other existing operational priorities must be considered when responding to a message. Always use sound pilot judgment. The Socata TBM 850 Pilot's Operating Handbook (POH) takes precedence over any conflicting guidance found in this section.*

A red 'X' may be the result of an LRU or an LRU function failure. The Figure 13-2 illustrates all possible flags and the responsible LRUs.

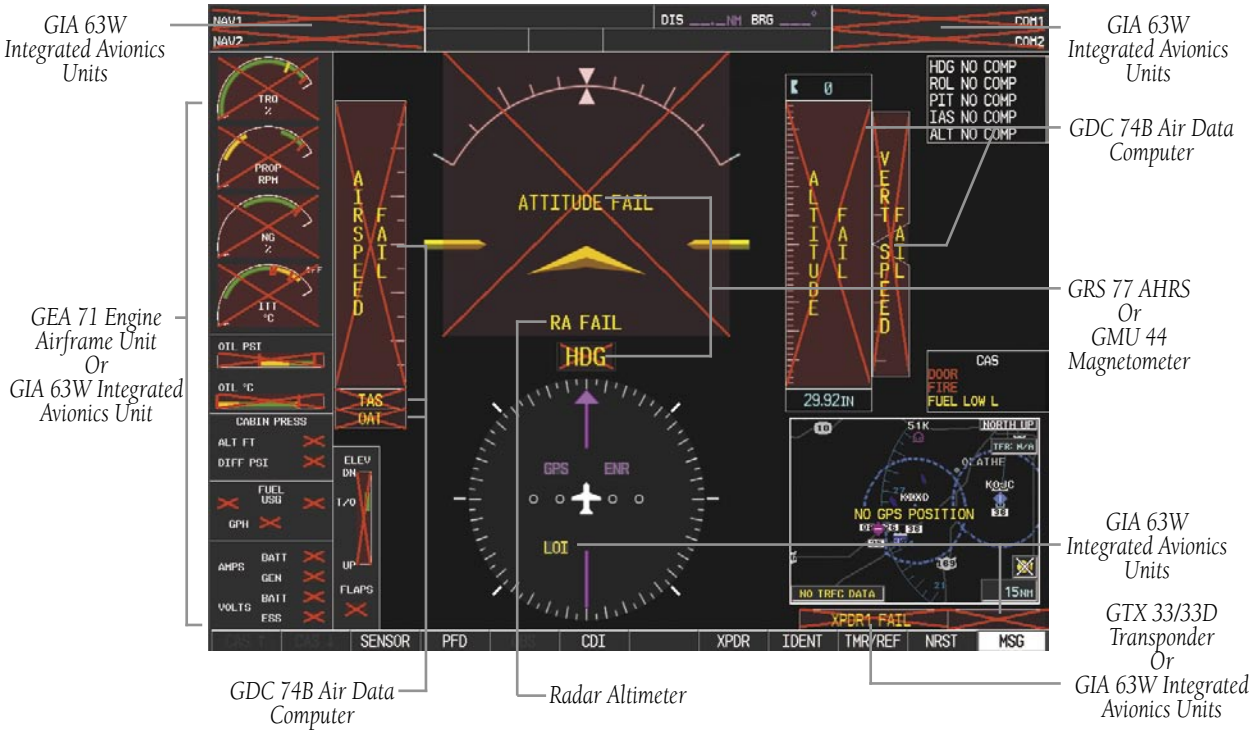
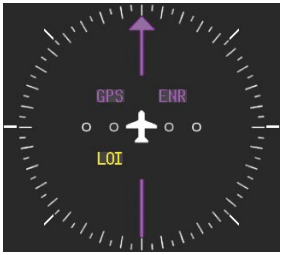


Figure 13-2 G1000 System Failure Annunciations

System Annunciation	Comment
	Attitude and Heading Reference System is aligning.
	Display system is not receiving attitude information from the AHRS.

System Annunciation	Comment
	Indicates a configuration module failure.
	This annunciation is only be seen when the autopilot is engaged. The annunciation indicates an AHRS monitor has detected an abnormal flight parameter, possibly caused by strong turbulence. In this case, the situation should correct itself within a few seconds. If there is an actual failure, a red "X" will soon appear over the Attitude Indicator.
	Display system is not receiving airspeed input from air data computer.
	Display is not receiving altitude input from the air data computer.
	Display is not receiving vertical speed input from the air data computer.
	When 'LOI' is displayed, GPS information is either not present or is invalid for navigation use. Note that AHRS utilizes GPS inputs during normal operation. AHRS operation may be degraded if GPS signals are not present (see POH).

System Annunciation	Comment
	Display is not receiving valid heading input from AHRS.
	Display is not receiving valid transponder information.
Other Various Red X Indications	A red 'X' through any other display field, such as engine instrumentation fields, indicates that the field is not receiving valid data.

MFD & PFD Message Advisories

Message	Comments
DATA LOST – Pilot stored data was lost. Recheck settings.	The pilot profile data was lost. System reverts to default pilot profile and settings. The pilot may reconfigure the MFD & PFDs with preferred settings, if desired.
XTALK ERROR – A flight display crosstalk error has occurred.	The MFD and PFDs are not communicating with each other. The G1000 system should be serviced.
PFD1 SERVICE – PFD1 needs service. Return unit for repair.	The PFD and/or MFD self-test has detected a problem. The G1000 system should be serviced.
PFD2 SERVICE – PFD2 needs service. Return unit for repair.	
MFD1 SERVICE – MFD1 needs service. Return unit for repair.	
MANIFEST – PFD1 software mismatch, communication halted.	The PFD and/or MFD has incorrect software installed. The G1000 system should be serviced.
MANIFEST – PFD2 software mismatch, communication halted.	
MANIFEST – MFD1 software mismatch, communication halted.	
PFD1 CONFIG – PFD1 config error. Config service req'd.	The PFD configuration settings do not match backup configuration memory. The G1000 system should be serviced.
PFD2 CONFIG – PFD2 config error. Config service req'd.	
MFD1 CONFIG – MFD1 config error. Config service req'd.	The MFD configuration settings do not match backup configuration memory. The G1000 system should be serviced.
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The MFD and PFDs have different software versions installed. The G1000 system should be serviced.

MFD & PFD Message Advisories (Cont.)

Message	Comments
PFD1 COOLING – PFD1 has poor cooling. Reducing power usage.	The PFD and/or MFD is overheating and is reducing power consumption by dimming the display. If problem persists, the G1000 system should be serviced.
PFD2 COOLING – PFD2 has poor cooling. Reducing power usage.	
MFD1 COOLING – MFD1 has poor cooling. Reducing power usage.	
PFD1 KEYSTK – PFD1 [key name] Key is stuck.	A key is stuck on the PFD and/or MFD bezel. Attempt to free the stuck key by pressing it several times. The G1000 system should be serviced if the problem persists.
PFD2 KEYSTK – PFD2 [key name] Key is stuck.	
MFD1 KEYSTK – MFD [key name] Key is stuck.	
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD1 configuration module backup memory has failed. The G1000 system should be serviced.
PFD1 VOLTAGE – PFD1 has low voltage. Reducing power usage	The PFD1 voltage is low. The G1000 system should be serviced.
PFD2 VOLTAGE – PFD2 has low voltage. Reducing power usage	The PFD2 voltage is low. The G1000 system should be serviced.
MFD1 VOLTAGE – MFD1 has low voltage. Reducing power usage	The MFD voltage is low. The G1000 system should be serviced.

Database Message Advisories

Message	Comments
MFD1 DB ERR – MFD1 aviation database error exists.	The MFD and/or PFD detected a failure in the aviation database. Attempt to reload the aviation database. If problem persists, the G1000 system should be serviced.
PFD1 DB ERR – PFD1 aviation database error exists.	
PFD2 DB ERR – PFD2 aviation database error exists.	

Database Message Advisories (Cont.)

Message	Comments
MFD1 DB ERR – MFD1 basemap database error exists.	The MFD and/or PFD detected a failure in the basemap database.
PFD1 DB ERR – PFD1 basemap database error exists.	
PFD2 DB ERR – PFD2 basemap database error exists.	
MFD1 DB ERR – MFD1 terrain database error exists.	The MFD and/or PFD detected a failure in the terrain database. Ensure that the terrain card is properly inserted in display. Replace terrain card. If problem persists, The G1000 system should be serviced.
PFD1 DB ERR – PFD1 terrain database error exists.	
PFD2 DB ERR – PFD2 terrain database error exists.	
MFD1 DB ERR – MFD1 terrain database missing.	The terrain database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 terrain database missing.	
PFD2 DB ERR – PFD2 terrain database missing.	
MFD1 DB ERR – MFD1 obstacle database error exists.	The MFD and/or PFD detected a failure in the obstacle database. Ensure that the data card is properly inserted. Replace data card. If problem persists, The G1000 system should be serviced.
PFD1 DB ERR – PFD1 obstacle database error exists.	
PFD2 DB ERR – PFD2 obstacle database error exists.	
MFD1 DB ERR – MFD1 obstacle database missing.	The obstacle database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 obstacle database missing.	
PFD2 DB ERR – PFD2 obstacle database missing.	

Database Message Advisories (Cont.)

Message	Comments
MFD1 DB ERR – MFD1 airport terrain database error exists.	The MFD and/or PFD detected a failure in the airport terrain database. Ensure that the data card is properly inserted. Replace data card. If problem persists, The G1000 system should be serviced.
PFD1 DB ERR – PFD1 airport terrain database error exists.	
PFD2 DB ERR – PFD2 airport terrain database error exists.	
MFD1 DB ERR – MFD1 airport terrain database missing.	The airport terrain database is present on another LRU, but is missing on the specified LRU.
PFD1 DB ERR – PFD1 airport terrain database missing.	
PFD2 DB ERR – PFD2 airport terrain database missing.	
MFD1 DB ERR – MFD1 Safe Taxi database error exists.	The MFD and/or PFD detected a failure in the Safe Taxi database. Ensure that the data card is properly inserted. Replace data card. If problem persists, The G1000 system should be serviced.
PFD1 DB ERR – PFD1 Safe Taxi database error exists.	
PFD2 DB ERR – PFD2 Safe Taxi database error exists.	
MFD1 DB ERR – MFD1 Chartview database error exists.	The MFD and/or PFDs detected a failure in the ChartView database (optional feature). Ensure that the data card is properly inserted. Replace data card. If problem persists, The G1000 system should be serviced.
MFD1 DB ERR – MFD1 FliteCharts database error exists.	The MFD and/or PFDs detected a failure in the FliteCharts database (optional feature). Ensure that the data card is properly inserted. Replace data card. If problem persists, The G1000 system should be serviced.
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The PFDs and MFD have different aviation database versions installed. Crossfill is off. Install correct aviation database version in all displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The PFDs and MFD have different aviation database types installed (Americas, European, etc.). Crossfill is off. Install correct aviation database type in all displays.
DB MISMATCH – Terrain database version mismatch.	The PFDs and MFD have different terrain database versions installed. Install correct terrain database version in all displays.

Database Message Advisories (Cont.)

Message	Comments
DB MISMATCH – Terrain database type mismatch.	The PFDs and MFD have different terrain database types installed. Install correct terrain database type in all displays.
DB MISMATCH – Obstacle database version mismatch.	The PFDs and MFD have different obstacle database versions installed. Install correct obstacle database version in all displays.
DB MISMATCH – Airport Terrain database mismatch.	The PFDs and MFD have different airport terrrain databases installed. Install correct airport terrain database in all displays.

GMA 1347D Message Advisories

Message	Comments
GMA1 FAIL – GMA1 is inoperative.	The audio panel self-test has detected a failure. The audio panel is unavailable. The G1000 system should be serviced.
GMA2 FAIL – GMA2 is inoperative.	
GMA XTALK – GMA crosstalk error has occurred.	An error has occurred in transferring data between the two GMAs. The G1000 system should be serviced.
GMA1 CONFIG – GMA1 config error. Config service req'd.	The audio panel configuration settings do not match backup configuration memory. The G1000 system should be serviced.
GMA2 CONFIG – GMA2 config error. Config service req'd.	
MANIFEST – GMA1 software mismatch, communication halted.	The audio panel has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GMA2 software mismatch, communication halted.	
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The audio panel self-test has detected a problem in the unit. Certain audio functions may still be available, and the audio panel may still be usable. The G1000 system should be serviced when possible.
GMA2 SERVICE – GMA2 needs service. Return unit for repair.	

GIA 63W Message Advisories

Message	Comments
GIA1 CONFIG – GIA1 config error. Config service req'd.	The GIA1 and/or GIA2 configuration settings do not match backup configuration memory. The G1000 system should be serviced.
GIA2 CONFIG – GIA2 config error. Config service req'd.	
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The GIA1 and/or GIA2 have an error in the audio configuration. The G1000 system should be serviced.
GIA2 CONFIG – GIA2 audio config error. Config service req'd.	
GIA1 COOLING – GIA1 temperature too low.	The GIA1 and/or GIA2 temperature is too low to operate correctly. Allow units to warm up to operating temperature.
GIA2 COOLING – GIA2 temperature too low.	
GIA1 COOLING – GIA1 over temperature.	The GIA1 and/or GIA2 temperature is too high. If problem persists, the G1000 system should be serviced.
GIA2 COOLING – GIA2 over temperature.	
GIA1 SERVICE – GIA1 needs service. Return the unit for repair.	The GIA1 and/or GIA2 self-test has detected a problem in the unit. The G1000 system should be serviced.
GIA2 SERVICE – GIA2 needs service. Return the unit for repair.	
HW MISMATCH – GIA hardware mismatch. GIA1 communication halted.	A GIA mismatch has been detected, where only one is WAAS capable.
HW MISMATCH – GIA hardware mismatch. GIA2 communication halted.	
MANIFEST – GIA1 software mismatch, communication halted.	The GIA1 and/or GIA 2 has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GIA2 software mismatch, communication halted.	

GIA 63W Message Advisories (Cont.)

Message	Comments
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The system has detected an over temperature condition in COM1 and/or COM2. The transmitter is operating at reduced power. If the problem persists, the G1000 system should be serviced.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has detected a failure in COM1 and/or COM2. COM1 and/or COM2 may still be usable. The G1000 system should be serviced when possible.
COM2 SERVICE – COM2 needs service. Return unit for repair.	
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 and/or COM2 external push-to-talk switch is stuck in the enable (or "pressed") position. Press the PTT switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
COM2 PTT – COM2 push-to-talk key is stuck.	
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 and/or COM2 transfer switch is stuck in the enabled (or "pressed") position. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
COM2 RMT XFR – COM2 remote transfer key is stuck.	
LOI – GPS integrity lost. Crosscheck with other NAVS.	GPS integrity is insufficient for the current phase of flight.
GPS NAV LOST – Loss of GPS navigation. Insufficient satellites.	Loss of GPS navigation due to insufficient satellites.
GPS NAV LOST – Loss of GPS navigation. Position error.	Loss of GPS navigation due to position error.
GPS NAV LOST – Loss of GPS navigation. GPS fail.	Loss of GPS navigation due to GPS failure.
ABORT APR – Loss of GPS navigation. Abort approach.	Abort approach due to loss of GPS navigation.
APR DWNGRADE – Approach downgraded.	Vertical guidance generated by WAAS is unavailable, use LNAV only minimums.
TRUE APR – True north approach. Change HDG reference to TRUE.	Displayed after passing the first waypoint of a true north approach when the nav angle is set to 'AUTO'.

GIA 63W Message Advisories (Cont.)

Message	Comments
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver may still be available. The G1000 system should be serviced.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	A failure has been detected in the NAV1 and/or NAV2 receiver. The receiver may still be available. The G1000 system should be serviced.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The remote NAV1 and/or NAV2 transfer switch is stuck in the enabled (or "pressed") state. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	
G/S1 FAIL – G/S1 is inoperative.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The G1000 system should be serviced.
G/S2 FAIL – G/S2 is inoperative.	
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The receiver may still be available. The G1000 system should be serviced when possible.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	

GEA 71 Message Advisories

Message	Comments
GEA1 CONFIG – GEA1 config error. Config service req'd.	The GEA1 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
GEA2 CONFIG – GEA2 config error. Config service req'd.	The GEA2 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
MANIFEST – GEA1 software mismatch, communication halted.	The #1 GEA 71 has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GEA2 software mismatch, communication halted.	The #2 GEA 71 has incorrect software installed. The G1000 system should be serviced.

GTX 33 & GTX 33D Message Advisories

Message	Comments
XPDR1 CONFIG – XPDR1 config error. Config service req'd.	The transponder configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
XPDR2 CONFIG – XPDR2 config error. Config service req'd.	The transponder configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
MANIFEST – GTX1 software mismatch, communication halted.	The transponder has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GTX2 software mismatch, communication halted.	The transponder has incorrect software installed. The G1000 system should be serviced.
XPDR1 SRVC – XPDR1 needs service. Return unit for repair.	The #1 transponder should be serviced when possible.
XPDR2 SRVC – XPDR2 needs service. Return unit for repair.	The #2 transponder should be serviced when possible.
XPDR1 FAIL – XPDR1 is inoperative.	There is no communication with the #1 transponder.
XPDR2 FAIL – XPDR2 is inoperative.	There is no communication with the #2 transponder.

GRS 77 Message Advisories

Message	Comments
AHRS1 TAS – AHRS1 not receiving airspeed.	The #1 AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed. The G1000 system should be serviced.
AHRS2 TAS – AHRS2 not receiving airspeed.	The #2 AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 using backup GPS source.	The #1 AHRS is using the backup GPS path. Primary GPS path has failed. The G1000 system should be serviced when possible.
AHRS2 GPS – AHRS2 using backup GPS source.	The #2 AHRS is using the backup GPS path. Primary GPS path has failed. The G1000 system should be serviced when possible.
AHRS1 GPS – AHRS1 not receiving any GPS information.	The #1 AHRS is not receiving any or any useful GPS information. Check AFMS limitations. The G1000 system should be serviced.
AHRS2 GPS – AHRS2 not receiving any GPS information.	The #2 AHRS is not receiving any or any useful GPS information. Check AFMS limitations. The G1000 system should be serviced.

GRS 77 Message Advisories (Cont.)

Message	Comments
AHRS1 GPS – AHRS1 not receiving backup GPS information.	The #1 AHRS is not receiving backup GPS information. The G1000 system should be serviced.
AHRS2 GPS – AHRS2 not receiving backup GPS information.	The #2 AHRS is not receiving backup GPS information. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 operating exclusively in no-GPS mode.	The #1 AHRS is operating exclusively in no-GPS mode. The G1000 system should be serviced.
AHRS2 GPS – AHRS2 operating exclusively in no-GPS mode.	The #2 AHRS is operating exclusively in no-GPS mode. The G1000 system should be serviced.
AHRS MAG DB – AHRS magnetic model database version mismatch.	The #1 AHRS and #2 AHRS magnetic model database versions do not match.
AHRS1 SRVC – AHRS1 Magnetic-field model needs update.	The #1 AHRS earth magnetic field model is out of date. Update magnetic field model when practical.
AHRS2 SRVC – AHRS2 Magnetic-field model needs update.	The #2 AHRS earth magnetic field model is out of date. Update magnetic field model when practical.
GEO LIMITS – AHRS1 too far North/ South, no magnetic compass.	The aircraft is outside geographical limits for approved AHRS operation. Heading is flagged as invalid.
GEO LIMITS – AHRS2 too far North/ South, no magnetic compass.	
MANIFEST – GRS1 software mismatch, communication halted.	The #1 AHRS has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GRS2 software mismatch, communication halted.	The #2 AHRS has incorrect software installed. The G1000 system should be serviced.

GMU 44 Message Advisories

Message	Comments
HDG FAULT – AHRS1 magnetometer fault has occurred.	A fault has occurred in the #1 GMU 44. Heading is flagged as invalid. The AHRS uses GPS for backup mode operation. The G1000 system should be serviced.
HDG FAULT – AHRS2 magnetometer fault has occurred.	A fault has occurred in the #2 GMU 44. Heading is flagged as invalid. The AHRS uses GPS for backup mode operation. The G1000 system should be serviced.
MANIFEST – GMU1 software mismatch, communication halted.	The GMU 44 has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GMU2 software mismatch, communication halted.	

GDL 69A Message Advisories

Message	Comments
GDL69 CONFIG – GDL 69 config error. Config service req'd.	GDL 69 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
GDL69 FAIL – GDL 69 has failed.	A failure has been detected in the GDL 69. The receiver is unavailable. The G1000 system should be serviced
MANIFEST – GDL software mismatch, communication halted.	The GDL 69 has incorrect software installed. The G1000 system should be serviced.

GWX 68 Alert Messages

Message	Comments
GWX CONFIG – GWX config error. Config service req'd.	GWX 68 configuration settings do not match those of the GDU configuration. The G1000 system should be serviced.
GWX FAIL – GWX is inoperative.	The GDU is not recieving status packet from the GWX 68 or the GWX 68 is reporting a fault. The GWX 68 radar system should be serviced.
GWX SERVICE – GWX needs service. Return unit for repair.	A failure has been detected in the GWX 68. The GWX 68 may still be usable.
WX ALERT – Possible severe weather ahead.	The GWX 68 indicates severe weather within ±10º of the aircraft heading at a range of 80 to 320 nm.
MANIFEST – GWX software mismatch, communication halted.	The GWX 68 has incorrect software installed. The G1000 system should be serviced.

GDC 74B Message Advisories

Message	Comments
ADC1 ALT EC – ADC1 altitude error correction is unavailable.	GDC1 or GDC2 is reporting that the altitude error correction is unavailable.
ADC2 ALT EC – ADC2 altitude error correction is unavailable.	
ADC1 AS EC – ADC1 airspeed error correction is unavailable.	GDC1 or GDC2 is reporting that the airspeed error correction is unavailable.
ADC2 AS EC – ADC2 airspeed error correction is unavailable.	

GDC 74B Message Advisories (Cont.)

Message	Comments
MANIFEST – GDC1 software mismatch, communication halted.	The GDC 74B has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GDC2 software mismatch, communication halted.	

GCU 475 Message Advisories

Message	Comments
GCU CNFG – GCU Config error. Config service req'd.	GCU 475 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
GCU FAIL – GCU is inoperative.	A failure has been detected in the GCU 475. The GCU 475 is unavailable.
MANIFEST – GCU software mismatch, communication halted.	The GCU 475 has incorrect software installed. The G1000 system should be serviced.
GCU KEYSTK – GCU [key name] Key is stuck.	A key is stuck on the GCU 475 bezel. Attempt to free the stuck key by pressing it several times. The G1000 system should be serviced if the problem persists.

GMC 710 Message Advisories

Message	Comments
GMC CONFIG – GMC Config error. Config service req'd.	Error in the configuration of the GMC 710.
GMC FAIL – GMC is inoperative.	A failure has been detected in the GMC 710. The GMC 710 is unavailable.
MANIFEST – GMC software mismatch. Communication halted.	The GMC 710 has incorrect software installed. The G1000 system should be serviced.
GMC KEYSTK – GMC [key name] Key is stuck.	A key is stuck on the GMC 710 bezel. Attempt to free the stuck key by pressing it several times. The G1000 system should be serviced if the problem persists.

Miscellaneous Message Advisories

Message	Comments
FPL WPT LOCK – Flight plan waypoint is locked.	Upon power-up, the G1000 system detects that a stored flight plan waypoint is locked. This occurs when an aviation database update eliminates an obsolete waypoint. The flight plan cannot find the specified waypoint and flags this message. This can also occur with user waypoints in a flight plan that is deleted. Remove the waypoint from the flight plan if it no longer exists in any database, Or update the waypoint name/identifier to reflect the new information.
FPL WPT MOVE – Flight plan waypoint moved.	The system has detected that a waypoint coordinate has changed due to a new aviation database update. Verify that stored flight plans contain correct waypoint locations.
TIMER EXPIRD – Timer has expired.	The system notifies the pilot that the timer has expired.
DB CHANGE – Database changed. Verify user modified procedures.	This occurs when a stored flight plan contains procedures that have been manually edited. This alert is issued only after an aviation database update. Verify that the user-modified procedures in stored flight plans are correct and up to date.
DB CHANGE – Database changed. Verify stored airways.	This occurs when a stored flight plan contains an airway that is no longer consistent with the aviation database. This alert is issued only after an aviation database update. Verify use of airways in stored flight plans and reload airways as needed.
FPL TRUNC – Flight plan has been truncated.	This occurs when a newly installed aviation database eliminates an obsolete approach or arrival used by a stored flight plan. The obsolete procedure is removed from the flight plan. Update flight plan with current arrival or approach.
LOCKED FPL – Cannot navigate locked flight plan.	This occurs when the pilot attempts to activate a stored flight plan that contains locked waypoint. Remove locked waypoint from flight plan. Update flight plan with current waypoint.
WPT ARRIVAL – Arriving at waypoint -[xxxx]	Arriving at waypoint [xxxx], where [xxxx] is the waypoint name.
STEEP TURN – Steep turn ahead.	A steep turn is 15 seconds ahead. Prepare to turn.
INSIDE ARSPC – Inside airspace.	The aircraft is inside the airspace.
ARSPC AHEAD – Airspace ahead less than 10 minutes.	Special use airspace is ahead of aircraft. The aircraft will penetrate the airspace within 10 minutes.
ARSPC NEAR – Airspace near and ahead.	Special use airspace is near and ahead of the aircraft position.

Miscellaneous Message Advisories (Cont.)

Message	Comments
ARSPC NEAR – Airspace near – less than 2 nm.	Special use airspace is within 2 nm of the aircraft position.
APR INACTV – Approach is not active.	The system notifies the pilot that the loaded approach is not active. Activate approach when required.
SLCT FREQ – Select appropriate frequency for approach.	The system notifies the pilot to load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach.
SLCT NAV – Select NAV on CDI for approach.	The system notifies the pilot to set the CDI to the correct NAV receiver. Set the CDI to the correct NAV receiver.
PTK FAIL – Parallel track unavailable: bad geometry.	Bad parallel track geometry.
PTK FAIL – Parallel track unavailable: invalid leg type.	Invalid leg type for parallel offset.
PTK FAIL – Parallel track unavailable: past IAF.	IAF waypoint for parallel offset has been passed.
UNABLE V WPT – Can't reach current vertical waypoint.	The current vertical waypoint can not be reached within the maximum flight path angle and vertical speed constraints. The system automatically transitions to the next vertical waypoint.
VNV – Unavailable. Unsupported leg type in flight plan.	The lateral flight plan contains a procedure turn, vector, or other unsupported leg type prior to the active vertical waypoint. This prevents vertical guidance to the active vertical waypoint.
VNV – Unavailable. Excessive track angle error.	The current track angle error exceeds the limit, causing the vertical deviation to go invalid.
VNV – Unavailable. Excessive crosstrack error.	The current crosstrack exceeds the limit, causing vertical deviation to go invalid.
VNV – Unavailable. Parallel course selected.	A parallel course has been selected, causing the vertical deviation to go invalid.
NO WGS84 WPT – Non WGS 84 waypoint for navigation -[xxxx]	The selected waypoint [xxxx] does not use the WGS 84 datum. Cross-check position with alternate navigation sources.
TRAFFIC FAIL – Traffic device has failed.	The G1000 is no longer receiving data from the traffic system. The traffic device should be serviced.

Miscellaneous Message Advisories (Cont.)

Message	Comments
STRMSCP FAIL – Stormscope has failed.	Stormscope has failed. The G1000 system should be serviced.
FAILED PATH – A data path has failed.	A data path connected to the GDU or the GIA 63/W has failed.
MAG VAR WARN – Large magnetic variance. Verify all course angles.	The GDU's internal model cannot determine the exact magnetic variance for geographic locations near the magnetic poles. Displayed magnetic course angles may differ from the actual magnetic heading by more than 2°.
SCHEDULER [#] – <message>.	Message criteria entered by the user.
ECS – Service required.	The environmental control system has failed.
CRUISE I – Cruise I conditions met.	Cruise I engine trend data log has been captured.
CRUISE II – Cruise II conditions met.	Cruise II engine trend data log has been captured.
EXCEEDANCE – Engine exceedance data is being logged.	An engine exceedance log has been captured.

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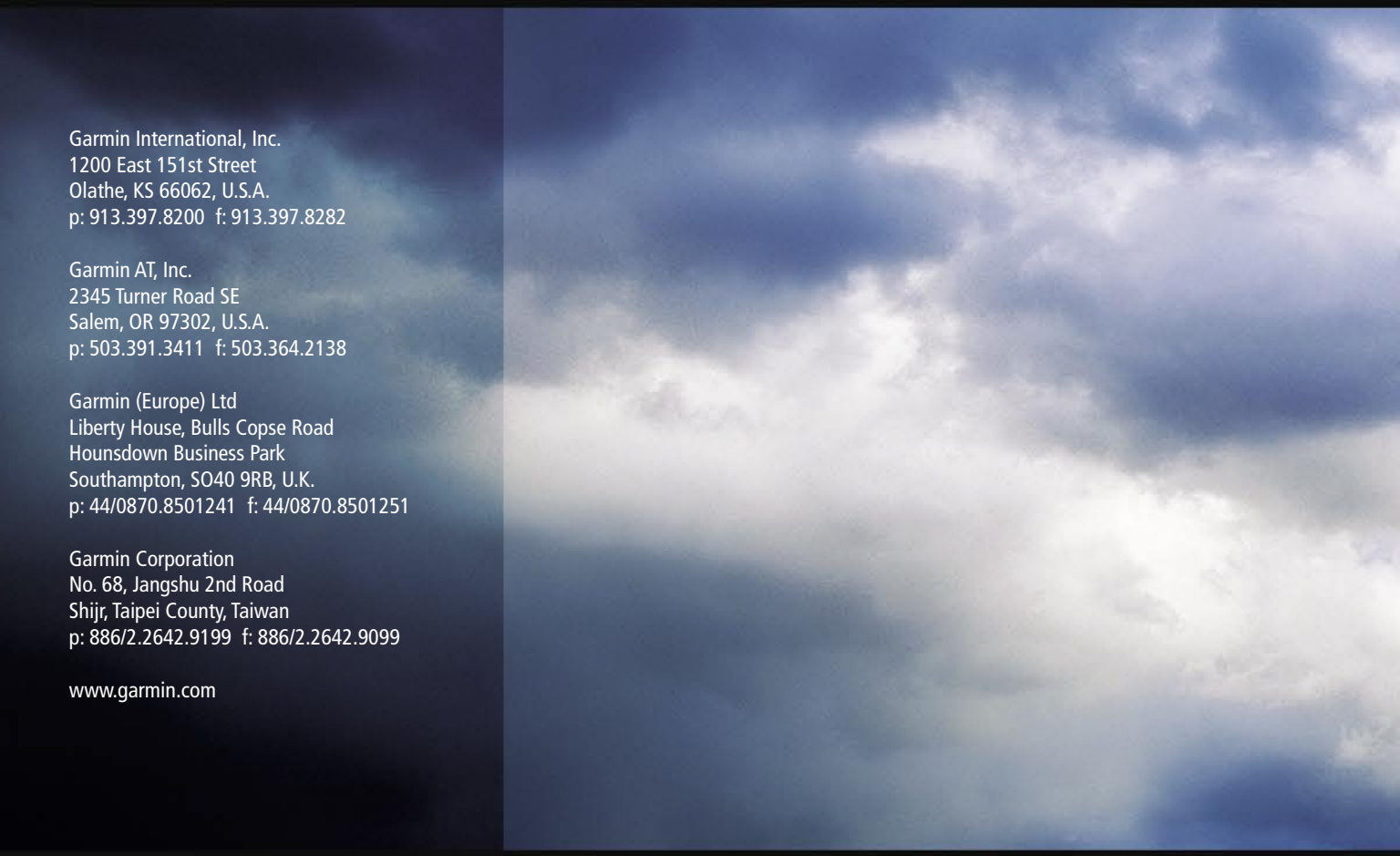

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